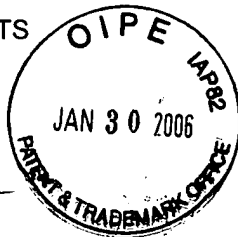


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By Scott Hewett
Scott Hewett



Handwritten initials: JH/AR
PATENT
Attorney Docket No. CP0001US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Hung, P.

Application No.: 09/625,442

Filed: 07/26/2000

For: CONFIGURABLE ELECTRONIC
REDEEMABLE COUPON

Examiner: Carlson, J. D.

Art Unit: 3622

**AMENDED APPEAL BRIEF UNDER
37 C.F.R. § 41.37**

MAIL STOP APPEAL BRIEF- PATENTS
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

A Notice of Appeal and fees for the above-referenced matter was mailed 8/8/2005 in response to the final Office action mailed 5/12/2005. An Appeal Brief was mailed with fees on 10/7/2005. A Notification of Non-Compliant Appeal Brief was mailed 12/29/2005 with a one-month shortened statutory period for response. This Amended Appeal Brief is being submitted in response to the Notification of Non-Compliant Appeal Brief. The undersigned believes that no fee is due with this Amended Appeal Brief; however, if a fee is due, the Commissioner is hereby authorized to charge any necessary fee for a small entity to USPTO Deposit Account No. 50-0891.

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(I) REAL PARTY IN INTEREST

Dr. Patrick S. Hung, Ph.D is the real party in interest pursuant to 37 *CFR* § 1.192(c)(1).

(II) RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to the Appellant's legal representative that will directly affect or be directly affected by or have a bearing on the Board's decision in pending appeals pursuant to 37 *CFR* § 1.192(c)(2).

(III) STATUS OF CLAIMS

Claims 2-9, 11-13, and 24 are now pending in the application. Claims 1, 10, and 14-23 have been cancelled. Claims 2-9, 11-13, and 24 have been finally rejected and are on appeal.

(IV) STATUS OF AMENDMENTS

No amendment has been filed subsequent to the final rejection mailed May 12, 2005.

(V) SUMMARY OF CLAIMED SUBJECT MATTER

The present invention addresses problems arising when scanning a barcode from an electronic display **[page 4, line 16; Fig. 1A, ref. num. 20]** of a portable electronic communication device **[page 4, lines 12-15; Fig. 1A, ref. num. 10]**, such as a mobile telephone or personal digital assistant ("PDA") **[page 3, lines 24-30]**. Problems arise when scanning a barcode from an electronic display that do not arise when scanning a printed barcode. Some problems arise because electronic displays used in portable electronic communication devices are intended to be viewed by human users and have attributes that contribute to scanning errors.

Other problems arise when the type of barcode format being displayed is different than the barcode format expected by the scanner. This problem arises with international traveling, for example **[page 5, lines 14-21]**. Claim 8 addresses this problem by reciting the advantageous and distinctive feature of having "a memory containing a computer-readable program for generating a scannable coupon on the electronic display of the configurable portable electronic communication device from the coupon information and including instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format."

Claim 8, the first independent device claim on file, defines:

A configurable portable electronic communication device **[page 4, lines 12-15; Fig. 1A, ref. num. 10]** comprising:

a receiver **[page 4, lines 16-17; Fig. 1A, ref. num. 22]** configured to receive an electronic wireless transmission **["signal," page 5, lines 1-3; Fig. 1A, ref. num. 34]** containing coupon information **[page 5, lines 2-7];**

a processor **[page 4, lines 15-16; Fig. 1A, ref. num. 16]** electronically coupled to the receiver;

an electronic display [page 4, line 16; Fig. 1A, ref. num. 20] coupled to the processor;

a memory [page 4, lines 24-31; Fig. 1A, ref. num. 18] containing a computer-readable program [page 4, lines 26-27; Fig. 1A, ref. num. 30] for generating a scannable coupon [page 5, line 23, Fig. 1B, ref. num. 40] on the electronic display of the configurable portable electronic communication device from the coupon information and including instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format [page 4, lines 29-31; page 9, lines 10-14].

Claim 13, the second independent device claim on file, defines:

A configurable portable electronic communication device [page 4, lines 12-15; Fig. 1A, ref. num. 10] comprising:

a receiver [page 4, lines 16-17; Fig. 1A, ref. num. 22] configured to receive a wireless transmission [“signal,” page 5, lines 1-3; Fig. 1A, ref. num. 34] containing coupon information [page 5, lines 2-7];

a processor [page 4, lines 15-16; Fig. 1A, ref. num. 16] electronically coupled to the receiver;

a persistent dot-matrix liquid crystal display [page 3, lines 3-4; page 6, line 26] having a minimum nominal dimension of less than or equal to about 13 mils [page 5, line 25; page 6, lines 11-12] and an inter-pixel spacing of less than or equal to about 1.3 mils [page 5, lines 26-30; page 6, line 12] coupled to the processor;

a memory [page 4, lines 24-31; Fig. 1A, ref. num. 18] containing a computer-readable program [page 4, lines 26-27; Fig. 1A, ref. num. 30], the processor reading the computer-readable program to generate a scannable coupon code [page 5, line 23; Fig. 1B, ref. num. 40] from the coupon information on the electronic display [page 4, line 16; Fig. 1A, ref. num. 20; page 5, lines 22-23, Fig. 1B, ref. num. 20].

Claim 2, the first dependent device claim on file, defines:

The configurable portable electronic communication device of claim 8 wherein the electronic display has a nominal minimum dimension of less than about 13 mils

[page 5, line 25; page 6, lines 11-12] and an inter-pixel spacing of less than about 1.3 mils **[page 5, lines 26-30; page 6, line 12]**.

Claim 3, the second dependent device claim on file, defines:

The configurable portable electronic communication device of claim 24 wherein the means for improving the first scan rate comprises a contrast-enhancing coating disposed on the electronic display **[page 7, lines 10-14; Fig. 1B, ref. num. 42]**.

Claim 4, the third dependent device claim on file, defines:

The configurable portable electronic communication device of claim 3 wherein the contrast-enhancing coating comprises an anti-reflective coating **[page 7, line 13]**.

Claim 5, the fourth dependent device claim on file, defines:

The configurable portable electronic communication device of claim 8 wherein the memory further contains a data file storing coupon information **[page 4, line 28; Fig. 1A, ref. num. 32; page 9, lines 21-22; page 9, line 16; page 9, line 27; Fig. 2D, ref. num. 32]**.

Claim 6, the fifth dependent device claim on file, defines:

The configurable portable electronic communication device of claim 5 wherein the data file includes a plurality of subfiles **[page 9, line 27; Fig. 2D, ref. nums. 50, 52, 54]**, at least one of the plurality of subfiles containing a plurality of coupon data fields **[page 9, lines 28-29; Fig. 2D, ref. nums. 56, 58, 60]**, each of the coupon data fields in the subfile being related according to redemption **[page 9, line 29]**.

Claim 7, the sixth dependent device claim on file, defines:

The configurable portable electronic communication device of claim 5 wherein the coupon information is encrypted **[page 8, line 17]** and the computer-readable program contains instructions executable by the processor to decrypt the coupon information **[page 8, lines 25-26]**.

Claim 9, the seventh dependent device claim on file, defines:

The configurable portable electronic communication device of claim 24 wherein the electronic display is a dot-matrix liquid crystal display and the means for improving the first scan rate comprises having a strobe rate of the dot-matrix liquid crystal display sufficiently high to maintain sufficient contrast for electronic scanning of the scannable coupon shown on the dot-matrix liquid crystal display **[page 6, lines 24-26; page 6, line 30 - page 7, line 2]**.

Claim 11, the eighth dependent device claim on file, defines:

The configurable portable electronic communication device of claim 24 wherein the means for improving the first scan rate comprises a liquid crystal display having sufficient persistence to maintain sufficient contrast for electronic scanning of the scannable coupon shown on the liquid crystal display **[page 3, lines 3-4; page 6, line 26]**.

Claim 12, the ninth dependent device claim on file, defines:

The configurable portable electronic communication device of claim 8 wherein the electronic display is a dot-matrix liquid crystal display having pixels capable of maintaining a contrast ratio of at least 1:4 between a light portion of a bar code and a dark portion of a bar code **[page 7, lines 24-25]** displayed on the electronic display between a first strobe signal and a second strobe signal to the pixels.

Claim 24, the tenth dependent device claim on file, defines:

The configurable portable electronic communication device of claim 8 further comprising means for improving the first scan rate **[pixel aspect ratio means: page 6, line 11, line 14; nominal minimum dimension means: page 6, line 12; inter-pixel spacing means: page 6, lines 12-13, line 15; strobing means: page 6, lines 25-26; persistence means: page 6, line 29- page 7, line 3; contrast means: page 7, lines 10-11, lines 24-25, Fig. 1B, ref. num. 42; resolution means: page 7, lines 5-9]** of the scannable coupon from the electronic display of the configurable portable electronic communication device **[page 6, line 1 – page 7, line 31]**.

(VI) GROUNDS OF REJECTION TO BE REVIEWED

The following issues are on appeal:

A. Whether claims 2-9, 11-13, and 24 are unpatentable as being obvious in light of U.S. Patent No. 5,523,794 by Mankovitz et al. (hereinafter "Mankovitz").

B. Whether claim 8 is unpatentable as being obvious in light of Mankovitz in view of U.S. Patent No. 5,221,838 by Gutman et al. (hereinafter "Gutman").

(VII) ARGUMENTS

Issue 1: Whether claims 2-9, 11-13, and 24 are unpatentable as being obvious in light of Mankovitz.

Claim 8

Regarding independent claim 8, applicant respectfully submits that pursuant to 37 CFR § 1.111(c), claim 8 defines the following advantageous distinctive features that distinguishes over and avoids Mankovitz:

"a receiver configured to receive an electronic wireless transmission containing coupon information;" and

"a memory containing a computer-readable program for generating a scannable coupon on the electronic display of the configurable portable electronic communication device from the coupon information and including instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format"

The burden is on the Examiner to set forth a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988); and *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

"A rejection based on section 103 clearly must rest on a factual basis, and these facts must be interpreted without hindsight reconstruction of the invention from the prior art. In making this evaluation, all the facts must be considered. The Patent Office has the initial duty of supplying the factual basis for its rejections. It may not, because *it* may *doubt* that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis. To the extent the Patent Office rulings *are* so supported, there is no basis for resolving doubts in favor of the Patent Office determination when there are deficiencies in the record as to the necessary factual basis supporting its legal conclusion of obviousness." *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), cert. denied, 389 U.S. 1057 (1968) (emphasis in original).

The claims must be analyzed, not in a vacuum, but always in light of the teachings of the disclosure as it would be interpreted by one of ordinary skill in the art (MPEP 2106(2)). During patent examination, the pending claims must be "given [their] broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000) (emphasis added). The broadest reasonable interpretation of the claims must be consistent with the interpretation that those skilled in the art would reach. *In re Cortright*, 165 F.3d 1353, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999).

On page 7 of the final Office action, the Examiner states that the term “configurable portable electronic communication device is presented in the preamble, but it is in the body of the claim that sets forth structural features which [*sic*] define such a device.” In claims directed to articles and apparatus, any phraseology in the preamble that limits the structure of that article or apparatus must be given weight. *In re Stencel*, 4 USPQ2d 1071 (Fed. Cir. 1987).

Furthermore, the Amendment originally sent via facsimile transmission on January 20, 2004 (entered pursuant to the Request for Continued Examination mailed on February 24, 2004), amended claim 8 to recite the “configurable portable electronic communication device” in the body of the claim. As pointed out in the Remarks section of that Amendment, all elements of a claim must be considered. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Since claim 8 recites the configurable portable electronic communication device in the body of the claim, the Examiner is not free to ignore this element of claim 8.

The Examiner asserts on page 2 of the final Office action mailed 05/12/2005 (“Office action”) that Mankovitz teaches a device having a wireless receiver. However, claim 8 recites “a receiver configured to receive an electronic wireless transmission.” Mankovitz does not disclose or suggest such a receiver. Mankovitz discloses an infrared detector (Col. 3, lines 51-53, Fig. 1A, ref. num. 16). On page 6 of the Office action, the Examiner states that “[t]he IR receiver port 16 of Mankovitz et al [*sic*] is taken to provide such a feature.” In Col. 3, Mankovitz defines reference numeral 16 as “an IR detector”, not “an IR receiver port”, as stated by the Examiner. In either event, the IR detector is not a receiver configured to receive an electronic wireless transmission.

The Examiner further states that “[b]oth RF and IR are in the electromagnetic spectrum and are taken to be “electronic” transmissions,” and that “[e]ven though the IR may be optically perceivable to a human (in the visible spectrum), the transmission is nonetheless taken as “electronic.”” *Final Office Action*, page 6. Appellant traverses the assertion that IR is optically perceivable or in the visible spectrum. IR is generally considered to be outside the visible spectrum, specifically, to have wavelengths longer than visible light. Furthermore, the undersigned urges that one of skill in the art of

electronic wireless transmissions would not consider IR signals to be wireless electronic transmissions.

An IR detector is not a receiver configured to receive an electronic wireless transmission. IR and RF systems are completely different, operate on completely different principles, and are recognized as being different by those of ordinary skill in the art. As explained on page 4, lines 16-18 of the *Written Description*, an electronic receiver, such as a wireless modem, coupled to an antenna (Fig. 1A, ref. num. 24) receives information broadcast from a transmitter. In comparison, an IR detector is illuminated by a beam of IR light from an IR emitter, as shown in Fig. 1A, ref. num. 14 of Mankovitz.

As is well-known in the art of IR data transfer, a photodetector converts the IR light from the IR transmitter into an electronic signal [see, e.g. Baker, *Wireless Communication Using the IrDA® Standard Protocol*, Microchip Technology, Inc. (2003), submitted as Exhibit A in the amendment mailed January 24, 2005, and *Introduction to IrDA*, ¶ 1, submitted as Exhibit B in the amendment mailed January 24, 2005); copies of which are included with the Evidence Appendix]. In contrast, an electronic wireless transmission is already in electronic form.

As explained in Exhibit A, IR technologies are better suited for short-range, point-to-point infrared communication channels. Portable electronic communication devices, such as cell phones, pagers, or PDAs [see, *Written Description*, page 4, line 14] having a receiver configured to receive electronic wireless transmissions can operate over much greater distances, and do not have to be aligned with the transmitter. Similarly, electronic wireless transmissions can travel through solid barriers, such as walls, that would block an IR transmission.

Mankovitz must be considered as a whole. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Considered as a whole, Mankovitz provides an IR detector suitable for the intended use of the electronic coupon described therein, with no motivation to replace the IR detector with a receiver configured to receive an electronic wireless transmission. Substituting the IR detector of Mankovitz for the receiver recited in claim 8 would

change the operating principle of the electronic coupon of Mankovitz and require substantial redesign to both the electronic coupon and to the controller. Such substantial reconstruction and redesign contraindicates the Examiners holding of obviousness. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

An IR beam is not an “electronic wireless transmission” nor is an IR beam equivalent to an “electronic wireless transmission.” The IR detector of Mankovitz does not teach or suggest “a receiver configured to receive an electronic wireless transmission containing coupon information.” Since the art relied upon by the Examiner in this rejection does not disclose or suggest all elements of claim 8, no *prima facie* case of obviousness has been established. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Claim 8 also recites the advantageous and distinctive feature of “a memory containing a computer-readable program for generating a scannable coupon on the electronic display of the configurable portable electronic communication device from the coupon information and including instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format” **[page 5, lines 5-21]**. Mankovitz states that coupon information can be displayed in an “alphanumeric format showing the vendor/producer/dealer, amount of discount and expiration date” **[Col. 5, lines 46-48]**, and that a “standard UPC bar code format is alternatively presented on the display” **[Col. 5, lines 50-51]**. The Examiner has stated that “the alphanumeric coupon [of Mankovitz] can be taken to be a second barcode format.” **[Interview Summary mailed 12/29/2003]**.

Whether the alphanumeric coupon format is a second barcode format must be interpreted as it would be interpreted by one of ordinary skill in the art in light of the teachings of the disclosure (MPEP 2106(2)). The broadest reasonable interpretation of claim 8 must be consistent with the interpretation that those skilled in the art would reach. *In re Cortright*, 165 F.3d 1353, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999). One of ordinary skill in the art would not consider the alphanumeric coupon format to be a second barcode format.

In the final Office action, the Examiner now states that the “alphanumeric format is easily understandable by humans, while the barcode is easily understandable by machines. It would have been obvious to one of ordinary skill at the time of the invention to have provided the ability for the device of Mankovitz et al to convert the coupon data between several human-readable languages (English, Spanish, etc.) as well as several machine-readable barcode symbologies/formats (UPC, UCC/EAN-128, etc.) so that different human operators and different POS scanners requiring various barcode formats can process the coupons, for added flexibility and universality.”

However, “the mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.” *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992). The Examiner has read into Mankovitz a teaching, namely “to have provided the ability for the device of Mankovitz et al to convert the coupon data between . . . several machine-readable barcode symbologies/formats,” that is simply not there. The Examiner is further in error because Mankovitz does not disclose or suggest the memory recited in claim 8; therefore Mankovitz does not provide all elements of the claim. See, *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

In fact, Mankovitz teaches away from claim 8 and away from the asserted motivation because Mankovitz states that the electronic coupons for local dealers (Col. 5, line 32, emphasis added) are transmitted to a controller (Fig. 1A, ref. num. 12) during vertical blanking intervals of television commercials. These electronic coupons are then transferred from the controller to a portable electronic coupon over an IR link or a cable. “In assessing prior art, court must have regard for all signposts contained in it; it must consider the passages which point away from the invention as well as those said to point toward it.” *General Tire and Rubber Co. v. Firestone Tire and Rubber Co.*, 174 USPQ 427, 429 (ND Ohio, 1972). Mankovitz does not disclose or suggest providing translating capability for either alphanumeric or barcode display formats. Mankovitz teaches away from the modification urged by the Examiner because the electronic coupon of Mankovitz is intended for local dealers. Therefore no *prima facie* case of obviousness has been established.

The prior art does not contain the Examiner's stated motivation for making the modification of the electronic coupon of Mankovitz. The motivation asserted by the Examiner for converting a scannable coupon from a first scannable barcode format to a second scannable barcode format in the electronic wireless device is found in the Applicant's disclosure [**page 4, lines 29-31; page 9, lines 10-14**], not in the prior art. The undersigned urges that the Examiner's wording of the asserted motivation be compared to the Applicant's teachings on page 5, lines 10-21, wherein the Applicant states "Consider the user that travels internationally. A paper coupon generated in a store in California might not be usable in Hong Kong. Thus, the desires of both the coupon issuer and the consumer might be frustrated." "[T]he electronic coupon stored in the memory of the device can be re-configured to the local scanning standard."

An invention is not obvious when the suggestion to modify the prior art comes from the Applicant's teachings. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1984). The motivation for modifying the electronic coupon of Mankovitz asserted by the Examiner is strikingly similar to the Applicant's teachings, and seems to be nothing more than a retrospective view of the prior art, *i.e.* impermissible hindsight reasoning.

The Examiner's case of obviousness fails because all elements of claim 8 are not disclosed or suggested in Mankovitz, and also because the required motivation to modify Mankovitz as urged by the Examiner is lacking. Appellant respectfully requests that the Board remove this rejection of claim 8.

Claim 2

Claim 2, which depends from claim 8, defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

"wherein the electronic display has a nominal minimum dimension of less than about 13 mils and an inter-pixel spacing of less than about 1.3 mils."

The Applicant recognized that providing the electronic display with a nominal minimum dimension of less than about 13 mils and an inter-pixel spacing of less than about 1.3 mils **[page 6, lines 11-13]** improves scanning a barcode from an electronic display. The Applicant teaches that “the lines of a bar code . . . can be much finer than characters that are intended to be viewed by the user” **[page 6, lines 8-9]**. The Applicant further teaches that a nominal minimum dimension of less than about 13 mils and an inter-pixel spacing of less than about 1.3 mils are desirable for barcode scanning **[page 6, lines 12-15]**.

The Examiner takes Official Notice “that is well known that the visual quality of a barcode is related to the success in registering an error-free scan,” and that “Bushnell’s Bar Code reference supports this and one of ordinary skill would recognize the same relationship between visual clarity and scanning success regardless of whether the barcode was printed or electronically displayed.” The Examiner is in error for several reasons.

First, *visual* clarity is not the primary issue when scanning a barcode from an electronic display, scannability is. Visual clarity is an issue when designing an electronic display to be viewed by a human eye. However, conventional cell phones with electronic displays intended for viewing have often have undesirable characteristics for scanning, such as coarse resolution, low strobe rates, and quick relaxation **[page 6, lines 27-30]**.

Second, unsupported statements that aspects of invention are common knowledge are generally insufficient. *In re Zurko*, 258 F.3d 1379, 59 USPQ2d 1693 (Fed. Cir. 2001). The Examiner takes Official Notice of a generality (“visual quality”) but does not indicate any facts in Bushnell’s Barcode reference to support his assertion that “*visual* quality of a barcode is related to the success in registering an error-free scan” from an electronic display. Official Notice unsupported by documentary evidence is only appropriate for facts that are capable of such instant and unquestionable demonstration as to defy dispute. In this instance, the Applicant teaches that “[n]ormally, quick response and quick relaxation of the liquid crystals are desired to provide a display that changes quickly,” **[page 6, lines 27-29]** however, slow relaxation (e.g. persistence) is

desirable for scanning **[page 7, line 1]**. Thus, the Examiner's position is not unquestionable and does not defy dispute. The Examiner provides no facts that first scan rate of barcodes from an electronic display is even recognized as a concern in the prior art, much less how to improve it. The Examiner's unsupported Official Notice is untenable. Mankovitz does not teach or suggest claim 2, and claim 2 is further patentable.

Claim 3

Claim 3, which depends from claim 24, defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

"the means for improving the first scan rate comprises a contrast-enhancing coating disposed on the electronic display."

The Applicant teaches that scanning barcodes from electronic displays is more problematic than scanning paper coupons because "[r]eflected light off the window [covering the LCD display] can interfere with some scanners, thus the addition of an anti-reflective or other contrast-enhancing coating is particularly desirable with these devices" **[page 7, lines 17-19]**. On page 4 of the final Office action, the Examiner states that it would have been obvious to provide an "anti-reflective coating in order to provide a display of sufficient clarity so that a displayed barcode could be capable of being scanned successfully." The Examiner also argues that Mankovitz provides an electronic coupon with an electronic display that is operatively scannable (page 3 of the final Office action).

The motivation urged by the Examiner to provide an anti-reflective coating is contrary to the Examiner's own position that the display of Mankovitz is already operably scannable. Mankovitz does not recognize the problem of first scan errors, and does not teach or suggest adding a contrast-enhancing coating disposed on the electronic display to improve the first scan error rate.

The Examiner takes Official Notice "that is well known that the visual quality of a

barcode is related to the success in registering an error-free scan,” and that “Bushnell's Bar Code reference supports this and one of ordinary skill would recognize the same relationship between visual clarity and scanning success regardless of whether the barcode was printed or electronically displayed.” The Examiner is in error for several reasons. *Visual* clarity is not the primary issue when scanning a barcode from an electronic display, scannability is. Visual clarity is an issue when designing an electronic display to be viewed by a human eye. However, as the Applicant explains on page 6 of the *Written Description*, conventional cell phones with electronic displays intended for viewing have often have undesirable characteristics for scanning, such as coarse resolution, low strobe rates, and quick relaxation **[page 6, lines 27-30]**.

Unsupported statements that aspects of invention are common knowledge are generally insufficient. *In re Zurko*, 258 F.3d 1379, 59 USPQ2d 1693 (Fed. Cir. 2001). The Examiner takes Official Notice of a generality (“visual quality” of printed barcodes) that is not particularly relevant to scanning of barcodes from an electronic display, but does not indicate where in Bushnell's Barcode reference any facts exist to support his assertion that “*visual* quality of a barcode is related to the success in registering an error-free scan” from an electronic display. Official Notice unsupported by documentary evidence is only appropriate for facts that are capable of such instant and unquestionable demonstration as to defy dispute. In this instance, the Applicant teaches that “[n]ormally, quick response and quick relaxation of the liquid crystals are desired to provide a display that changes quickly;” **[page 6, lines 27-29]** however, slow relaxation (e.g. persistence) is desirable for scanning **[page 7, line 1]**. Thus, the Examiner's position is not unquestionable and does not defy dispute and his Official Notice is untenable. The Examiner provides no facts that first scan rate of barcodes from an electronic display is even recognized as a concern in the prior art, much less how to improve it.

The Examiner argues that the electronic coupon of Mankovitz is presumed to be operable; however, mere operability does not teach or suggest claim 3. Mere operability is likely to suffer from a low first scan rate. Mankovitz does not recognize the problem of first scan errors occurring when scanning a barcode from an electronic

display, and does not teach or suggest claim 3. Claim 3 is further patentable.

Claim 4

Claim 4, which depends from claim 3, defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

“the contrast-enhancing coating comprises an anti-reflective coating”

The Applicant recognized the problems scanning barcodes from electronic displays, and teaches that first scan rate can be improved by using an anti-reflective coating on the electronic display **[page 7, lines 10-12]**.

The Examiner takes Official Notice “that is well known that the visual quality of a barcode is related to the success in registering an error-free scan,” and that “Bushnell’s Bar Code reference supports this and one of ordinary skill would recognize the same relationship between visual clarity and scanning success regardless of whether the barcode was printed or electronically displayed.” The Examiner is in error for several reasons. First, *visual* clarity is not the issue when scanning a barcode from an electronic display. Visual clarity is an issue when designing an electronic display to be viewed by a human eye. However, as the Applicant explains on page 6 of the *Written Description*, conventional cell phones with electronic displays intended for viewing often have undesirable characteristics for scanning, such as coarse resolution, low strobe rates, and quick relaxation **[page 6, lines 27-30]**.

Second, unsupported statements that aspects of invention are common knowledge are generally insufficient. *In re Zurko*, 258 F.3d 1379, 59 USPQ2d 1693 (Fed. Cir. 2001). The Examiner takes Official Notice of a generality (“visual quality”) that is not relevant to scanning of barcodes from an electronic display, but does not indicate where in Bushnell’s Barcode reference any facts exist to support his assertion that “*visual* quality of a barcode is related to the success in registering an error-free scan” from an electronic display. Official Notice unsupported by documentary evidence is only appropriate for facts that are capable of such instant and unquestionable

demonstration as to defy dispute. While the Applicant has explained why electronic displays optimized for displaying scannable barcodes may be different than electronic displays optimized for viewing, the Examiner provides no facts that first scan rate of barcodes from an electronic display is even recognized as a concern in the art, or that the same attributes desirable for visual clarity result in an improved first scan rate. The Examiner's unsupported Official Notice is improper in his rejection of claim 4.

The Examiner argues that the electronic coupon of Mankovitz is presumed to be operable; however, mere operability does not teach or suggest claim 4. Mankovitz does not recognize the problem of first scan errors occurring when scanning a barcode from an electronic display, and does not teach or suggest claim 4. Claim 4 is further patentable.

Claim 7

Claim 7, which depends from claim 8 through claim 5, defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

"wherein the coupon information is encrypted and the computer-readable program contains instructions executable by the processor to decrypt the coupon information."

In other words, the computer-readable program of the configurable portable electronic communication device contains instructions executable by the processor to decrypt the coupon information. Mankovitz states that the video blanking interval ("VBI") signal is encrypted (Col. 5, lines 36-38). The VBI signal is provided to the controller 12 (Mankovitz, Figs. 1A and 3). The Applicant submits that decryption occurs in the controller, not in the electronic coupon of Mankovitz.

The Examiner argues it would have been obvious to have provided decryption functionality in the portable coupon device so that pirated/hacked/copycat portable coupon devices lacking such decryption ability cannot be used with the system of Mankovitz, thus providing the authorization security described by Mankovitz. The

Examiner appears to be saying that Mankovitz provides authorization security (see Col. 9, lines 15-18, describing interrogation of the portable data coupon for serial number, see also, Fig. 2, ref. num. 32 "IR emitter" and related description), but after reading Mankovitz and taking it as a whole, one of ordinary skill in the art would be lead to do something completely different to substitute for what Mankovitz teaches. The Examiner is not free to redesign the prior art in such a fashion. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

Furthermore, Mankovitz teaches transferring data between the controller and portable coupon device over either a cable, or an IR link. Both techniques are more immune to pirating than are electronic wireless transmissions, teaching away from the need to encrypt coupon information between the controller and electronic coupon, and thus teaching away from the desirability of providing decryption functionality in the electronic coupon of Mankovitz. Mankovitz does not teach or suggest claim 7, and claim 7 is further patentable.

Claim 11

Claim 11, which depends from claim 24, defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

"the means for improving the first scan rate comprises a liquid crystal display having sufficient persistence to maintain sufficient contrast for electronic scanning of the scannable coupon shown on the liquid crystal display."

The Applicant explains that conventional electronic displays are intended to be viewed by a human eye, which compensates for strobing **[page 6, lines 16, 21-23]**. Stobing of an electronic display intended for viewing may not be suitable for scanning if the pixels relax to a lighter state that does not provide sufficient contrast for accurate scanning **[page 6, lines 18-21]**.

The Examiner argues in his rejection of claim 11 that Mankovitz has ""sufficient" levels of inherent persistence and inherent strobe rate to enable scanning of the

displayed barcodes.” *Final Office Action*, page 3. An analogy might be that, if the first disclosure of a field effect transistor (“FET”) is presumed to be operative, there is nothing patentably inventive about improving the performance (e.g. speed) of any FET because the performance of the FET is “sufficient” for some sort of operation. However, there are hundreds, if not thousands, of patents on improving FET operation, ranging from improving carrier mobility to reducing channel length.

On page 7 of the final Office action, the Examiner states that “[i]f Mankovitz et al’s barcodes and scanner equipment quality are anything other than the worst possible quality/tolerance, than the equipment and barcodes used by Mankovitz et al can be said to be of “improved quality”.” Once again, the Examiner is using terms not relevant to the claim language. The claims relate to an electronic display, not scanner equipment. The Examiner is also in error regarding his assertion that the barcode could be anything other than the “worst possible quality.” As taught by the Applicant, a barcode displayed on an electronic display might be eventually scanned, but that it is desirable to achieve an accurate scan (reading) of the barcode on the first scan. A barcode on an electronic display does not have to be the “worst possible quality” to have a high first scan error rate.

The Examiner’s position is contrary to 35 U.S.C. § 101, which provides patentability for “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof” [see also, 37 C.F.R. § 1.71 (b), (c)]. Mankovitz, does not recognize that first scan errors of barcodes from an electronic display can arise because of strobing, and does not teach that as a problem, and offers no teaching or suggestion on how to improve first scan rate from an electronic display. The Applicant teaches a device with means for improving the first scan rate comprising a liquid crystal display having sufficient persistence to maintain sufficient contrast for electronic scanning of the scannable coupon shown on the liquid crystal display that is superior to the electronic coupon disclosed in Mankovitz. Mankovitz does not teach or suggest claim 11, and claim 11 is further patentable.

Claim 12

Claim 12, which depends from claim 8, defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

“wherein the electronic display is a dot-matrix liquid crystal display having pixels capable of maintaining a contrast ratio of at least 1:4 between a light portion of a bar code and a dark portion of a bar code displayed on the electronic display between a first strobe signal and a second strobe signal to the pixels.”

The Applicant teaches that conventional electronic displays are intended to be viewed by a human eye, which compensates for strobing, and that pixel value might change during scanning to a state that does not provide sufficient contrast for scanning a barcode **[page 6, lines 16 - 23]**. The Applicant teaches that maintaining a contrast ratio of at least 1:4 between a light portion of a bar code and a dark portion of a bar code between strobe signals is desirable for scanning barcodes from an electronic display **[page 7, lines 24-25]**.

On page 3 of the final Office action, the Examiner argues in his rejection of claim 12 that “one of ordinary skill would have been clearly motivated to routinely experiment with such display characteristics in the display design so that the barcodes were displayed with sufficient clarity so that they can be successfully scanned.” This “obvious to try” argument fails because there is no teaching in Mankovitz regarding first scan errors. In order to routinely experiment as suggested by the Examiner, a particular parameter must first be recognized as a result - effective variable, *i.e.*, a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.

In re Antonie, 559 F.2d 618, 195 USPQ 6,8 (CCPA 1977) The Examiner invokes Bushnell's Bar Code reference for teaching clarity is desirable for printed barcodes; however, printed barcodes are static. The contrast between light and dark portions does not typically change as a printed barcode is being scanned. The disclosure of the

Bushnell reference does not provide sufficient teaching and would not have motivated one to modify the electronic coupon of Mankovitz to arrive at claim 12.

The Applicant teaches a device with means for improving the first scan rate comprising a liquid crystal display having pixels capable of maintaining a contrast ratio of at least 1:4 between a light portion of a bar code and a dark portion of a bar code displayed on the electronic display between a first strobe signal and a second strobe signal. Mankovitz does not teach or suggest the contrast ratio recited claim 12, and claim 12 is further patentable.

Claim 13

Independent claim 13 defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

“a receiver configured to receive a wireless transmission containing coupon information;” and

“a persistent dot-matrix liquid crystal display having a minimum nominal dimension of less than or equal to about 13 mils and an inter-pixel spacing of less than or equal to about 1.3 mils coupled to the processor”

The burden is on the Examiner to set forth a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988); and *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). “A rejection based on section 103 clearly must rest on a factual basis, and these facts must be interpreted without hindsight reconstruction of the invention from the prior art. In making this evaluation, all the facts must be considered. The Patent Office has the initial duty of supplying the factual basis for its rejections. It may not, because *it may doubt* that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis. To the extent the Patent Office

rulings *are* so supported, there is no basis for resolving doubts in favor of the Patent Office determination when there are deficiencies in the record as to the necessary factual basis supporting its legal conclusion of obviousness.” *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), cert. denied, 389 U.S. 1057 (1968) (emphasis in original).

The claims must be analyzed, not in a vacuum, but always in light of the teachings of the disclosure as it would be interpreted by one of ordinary skill in the art (MPEP 2106(2)). During patent examination, the pending claims must be "given [their] broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000) (emphasis added). The broadest reasonable interpretation of the claims must be consistent with the interpretation that those skilled in the art would reach. *In re Cortright*, 165 F.3d 1353, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999) (emphasis added).

The Examiner asserts on page 2 of the final Office action that Mankovitz teaches a device having a wireless receiver. However, claim 13 recites “a receiver configured to receive an electronic wireless transmission.” Mankovitz does not disclose or suggest such a receiver. Mankovitz discloses an infrared detector (Col. 3, lines 51-53, Fig. 1A, ref. num. 16). On page 6 of the final Office action, the Examiner states that “[t]he IR receiver port 16 of Mankovitz et al [*sic*] is taken to provide such a feature.” In Col. 3, Mankovitz defines reference numeral 16 as “an IR detector”, not “an IR receiver port”, as stated by the Examiner. In either event, the IR detector is not a receiver configured to receive an electronic wireless transmission.

The Examiner further states that “[b]oth RF and IR are in the electromagnetic spectrum and are taken to be “electronic” transmissions,” and that “[e]ven though the IR may be optically perceivable to a human (in the visible spectrum), the transmission is nonetheless taken as “electronic.”” *Final Office Action*, page 6.

Appellant traverses the Examiner’s assertion that IR is optically perceivable or in the visible spectrum. IR is generally considered to be outside the visible spectrum, specifically, to have wavelengths longer than visible light. Furthermore, one of skill in

the art of electronic wireless transmissions would not consider IR signals to be wireless electronic transmissions.

An IR detector is not a receiver configured to receive an electronic wireless transmission. IR and RF systems are completely different, operate on completely different principles, and are recognized as being different by those of ordinary skill in the art. As explained on page 4, lines 16-18 of the *Written Description*, an electronic receiver, such as a wireless modem, coupled to an antenna (Fig. 1A, ref. num. 24) receives information broadcast from a transmitter. In comparison, an IR detector is illuminated by a beam of IR light from an IR emitter, as shown in Fig. 1A, ref. num. 14 of Mankovitz.

As is well-known in the art of IR data transfer, a photodetector converts the IR light from the IR transmitter into an electronic signal [see, e.g. Baker, *Wireless Communication Using the IrDA® Standard Protocol*, Microchip Technology, Inc. (2003), submitted as Exhibit A in the amendment mailed January 24, 2005, and *Introduction to IrDA*, ¶ 1, submitted as Exhibit B in the amendment mailed January 24, 2005); copies of which are included with the Evidence Appendix]. In contrast, an electronic wireless transmission is already in electronic form.

As explained in Exhibit A, IR technologies are better suited for short-range, point-to-point infrared communication channels. Portable electronic communication devices, such as cell phones, pagers, or PDAs [page 4, line 14] having a receiver configured to receive electronic wireless transmissions can operate over much greater distances, and do not have to be aligned with the transmitter. Similarly, electronic wireless transmissions can travel through solid barriers, such as walls, that would block an IR transmission.

Mankovitz must be considered as a whole. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Considered as a whole, Mankovitz provides an IR detector suitable for the intended use of the electronic coupon described therein, with no motivation to replace the IR detector with a receiver configured to receive an electronic wireless transmission. Substituting the IR detector of Mankovitz for the receiver recited in claim 13 would

change the operating principle of the electronic coupon of Mankovitz and require substantial redesign to both the electronic coupon and to the controller. Such substantial reconstruction and redesign contraindicates the Examiners holding of obviousness. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

An IR beam is not an “electronic wireless transmission” nor is an IR beam equivalent to an electronic wireless transmission. The IR detector of Mankovitz does not teach “a receiver configured to receive an electronic wireless transmission containing coupon information.” Since the art relied upon by the Examiner in this rejection does not disclose or suggest all elements of claim 13, no *prima facie* case of obviousness has been established. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Furthermore, the Applicant recognized that providing the electronic display with a nominal minimum dimension of less than about 13 mils and an inter-pixel spacing of less than about 1.3 mils **[page 6, lines 11-13]** improves scanning a barcode from an electronic display. Portable electronic communication devices typically have displays that are intended for displaying alphanumeric characters intended for viewing, which can have relatively coarse resolution **[page 6, lines 1-3]**. The Applicant teaches that “the lines of a bar code . . . can be much finer than characters that are intended to be viewed by the user” **[page 6, lines 8-9]**. The Applicant further teaches that these elements of claim 13 are desirable for barcode scanning **[page 6, lines 12-15]**.

The Examiner takes Official Notice “that is well known that the visual quality of a barcode is related to the success in registering an error-free scan,” and that “Bushnell's Bar Code reference supports this and one of ordinary skill would recognize the same relationship between visual clarity and scanning success regardless of whether the barcode was printed or electronically displayed.” The Examiner is in error for several reasons.

First, *visual* clarity is not the primary issue when scanning a barcode from an electronic display. Visual clarity is an issue when designing an electronic display to be viewed by a human eye. However, conventional cell phones with electronic displays intended solely for viewing have often have undesirable characteristics for scanning,

such as coarse resolution, low strobe rates, and quick relaxation **[page 6, lines 27-30]**.

Second, unsupported statements that aspects of invention are common knowledge are generally insufficient. *In re Zurko*, 258 F.3d 1379, 59 USPQ2d 1693 (Fed. Cir. 2001). The Examiner takes Official Notice of a generality (“visual quality”) that is not relevant to scanning of barcodes from an electronic display, but does not indicate where in Bushnell’s Barcode reference any facts exist to support his assertion that “*visual* quality of a barcode is related to the success in registering an error-free scan” from an electronic display. Official Notice unsupported by documentary evidence is only appropriate for facts that are capable of such instant and unquestionable demonstration as to defy dispute. The Examiner provides no facts in the prior art that first scan rate of barcodes from an electronic display is even recognized as a concern in the art, much less how to improve it. In this instance, the Applicant teaches that “the lines of a bar code . . . can be much finer than characters that are intended to be viewed by the user” **[page 6, lines 8-9]**. Thus, the Examiner’s position is not unquestionable and does not defy dispute. The Examiner provides no facts that first scan rate of barcodes from an electronic display is even recognized as a concern in the prior art, much less how to improve it. The Examiner’s unsupported Official Notice is untenable. Mankovitz does not teach or suggest claim 2, and claim 2 is further patentable. The Examiner’s unsupported Official Notice does not support the rejection of claim 13. Mankovitz does not teach or suggest claim 13, and claim 13 is further patentable.

Claim 24

Claim 24, which depends from claim 8, defines the following advantageous distinctive feature that further distinguishes over and avoids Mankovitz:

“means for improving the first scan rate of the scannable coupon from the electronic display of the configurable portable electronic communication device.”

The Applicant teaches several means for improving the first scan rate, including

pixel aspect ratio means **[page 6, line 11, line 14]**, nominal minimum dimension means **[page 6, line 12]**, inter-pixel spacing means **[page 6, lines 12-13, line 15]**, strobing means **[page 6, lines 25-26]**, persistence means **[page 6, line 29- page 7, line 3]**, contrast means **[page 7, lines 10-11, lines 24-25, Fig. 1B, ref. num. 42]**, and resolution means **[page 7, lines 5-9]**.

The Examiner argues in his rejection of claim 24 that Mankovitz has “sufficient” levels of inherent persistence and inherent strobe rate to enable scanning of the displayed barcodes.” *Detailed Action*, page 3. An analogy might be that, if the first disclosure of a field effect transistor (“FET”) is presumed to be operative, there is nothing patentably inventive about improving the performance (e.g. speed) of any FET because the performance of the FET is “sufficient” for some sort of operation, and that any operable device is deemed to be an improvement over an inoperable device. However, there are hundreds, if not thousands, of patents on improving FET operation, ranging from improving carrier mobility to reducing channel length.

On page 7 of the final Office action, the Examiner states that “[i]f Mankovitz et al’s barcodes and scanner equipment quality are anything other than the worst possible quality/tolerance, than the equipment and barcodes used by Mankovitz et al can be said to be of “improved quality”.” Once again, the Examiner is using terms not relevant to the claim language. The claims relate to an electronic display, not scanner equipment. The Examiner is also in error regarding his assertion that the barcode could be anything other than the “worst possible quality.” As taught by the Applicant, a barcode displayed on an electronic display might be eventually scanned, but that it is desirable to achieve an accurate scan (reading) of the barcode on the first scan. A barcode on an electronic display does not have to be the “worst possible quality” to have a high first scan error rate.

The Examiner’s position is contrary to 35 U.S.C. § 101, which provides patentability for “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof” **[see also, 37 C.F.R. § 1.71 (b), (c)]**. Mankovitz, does not recognize that first scan errors of barcodes from an electronic display can arise because of strobing, and does not teach that as a problem, and offers

no teaching or suggestion on how to improve first scan rate from an electronic display. The Applicant teaches a device with means for improving the first scan rate comprising a liquid crystal display having sufficient persistence to maintain sufficient contrast for electronic scanning of the scannable coupon shown on the liquid crystal display that is superior to the electronic coupon disclosed in Mankovitz. Mankovitz does not recognize any characteristics of an electronic display as affecting the first scan rate of a barcode rendered thereon, and does not teach any way of improving the first scan rate. Therefore, claim 24 is further patentable.

In view of the arguments presented above, the Appellant respectfully submits that the Examiner's grounds for the rejection of claims 2-9, 11-3, and 24 under 35 U.S.C. 103(a) as being unpatentable over Mankovitz are no longer tenable and Appellant respectfully requests that the Board of Patent Appeals and Interferences remove these rejections, and the case be passed to issue at an early date.

Issue 2: Whether claim 8 is unpatentable as being obvious in light of Mankovitz in view of U.S. Patent No. 5,221,838 by Gutman et al. (hereinafter "Gutman").

Claim 8

Claim 8 defines the following advantageous distinctive features that further distinguish over and avoids the combination of Mankovitz and Gutman:

"a memory containing a computer-readable program for generating a scannable coupon on the electronic display of the configurable portable electronic communication device from the coupon information and including instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format"

The burden is on the Examiner to set forth a *prima facie* case of obviousness. See, *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988); and

In re Piasecki, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). “A rejection based on section 103 clearly must rest on a factual basis, and these facts must be interpreted without hindsight reconstruction of the invention from the prior art. In making this evaluation, all the facts must be considered. The Patent Office has the initial duty of supplying the factual basis for its rejections. It may not, because *it may doubt* that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis. To the extent the Patent Office rulings *are* so supported, there is no basis for resolving doubts in favor of the Patent Office determination when there are deficiencies in the record as to the necessary factual basis supporting its legal conclusion of obviousness.” *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), cert. denied, 389 U.S. 1057 (1968) (emphasis in original).

The Examiner states that Mankovitz teaches programming to convert between different coupon formats (*Final Office Action*, page 6), and cites Gutman for teaching a portable electronic wallet that stores data received through scanning printed barcodes, and that several different bar code formats can be supported (*i.e.* scanned) by the device. The Examiner urges that it would have been obvious “to have provided programming with Mankovitz et al to convert between various formats of displayed bar-coded coupons so as to increase flexibility and universality of the device.” The undersigned again urges comparison of the asserted motivation with the Applicant’s teachings, as discussed above in support of claim 8, and notes that claim 8 recites instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format, not a first “coupon format” to a second “coupon format” as argued by the Examiner.

Gutman does not teach converting a displayed barcode from one format to another. The scanner of Gutman can scan various barcode formats, but does not convert one to another, it reads “barcode information in a known way to conveniently capture bar code information into the electronic wallet” (Col. 5, lines 3-6). Thus, the feature of scanning various barcode formats in the electronic wallet of Gutman in combination with the electronic coupon of Mankovitz does not render claim 8 obvious.

The Examiner's argument seems to be that, since various barcode formats exist, and that a barcode *scanning* device can *scan* various barcode formats, that one, after reading Mankovitz and Gutman and considering them both as wholes, would be led to provide the functionality taught by the Applicant and recited in claim 8 for the reasons taught by the Applicant. However, since Gutman teaches a scanning device that can support several different barcode formats, including the barcode format used by the electronic coupon of Mankovitz ("[a] standard UPC bar code format" Col. 5, line 50), there is no motivation for the modification urged by the Examiner. In fact, after reading Mankovitz and Gutman, one would more likely conclude that the ability of Gutman's scanner to read several different barcode formats teaches away from providing instructions for converting from one barcode format to another in the electronic coupon of Mankovitz. In other words, if the scanner can read the displayed barcode, there is no motivation to convert the displayed barcode to a different format.

Furthermore, even if these references were combined it would not result in the invention of claim 8 because there is no disclosure of a memory containing a computer-readable program for generating a scannable coupon on the electronic display of the configurable portable electronic communication device from the coupon information and including instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format in either reference in either reference. Thus, no *prima facie* case of obviousness has been established.

In view of the arguments presented above, the Appellant respectfully submits that the Examiner's grounds for the rejection of claim 8 under 35 U.S.C. 103(a) as being unpatentable over Mankovitz in view of Gutman are no longer tenable and Appellant therefore respectfully requests that the Board of Patent Appeals and Interferences remove this rejection, and the case be passed to issue at an early date.

Date: 1/27/2006

Respectfully Submitted



Scott W. Hewett
Reg. No. 41, 836

CLAIMS APPENDIX

2. The configurable portable electronic communication device of claim 8 wherein the electronic display has a nominal minimum dimension of less than about 13 mils and an inter-pixel spacing of less than about 1.3 mils.

3. The configurable portable electronic communication device of claim 24 wherein the means for improving the first scan rate comprises a contrast-enhancing coating disposed on the electronic display.

4. The configurable portable electronic communication device of claim 3 wherein the contrast-enhancing coating comprises an anti-reflective coating.

5. The configurable portable electronic communication device of claim 8 wherein the memory further contains a data file storing coupon information.

6. The configurable portable electronic communication device of claim 5 wherein the data file includes a plurality of subfiles, at least one of the plurality of subfiles containing a plurality of coupon data fields, each of the coupon data fields in the subfile being related according to redemption.

7. The configurable portable electronic communication device of claim 5 wherein the coupon information is encrypted and the computer-readable program contains instructions executable by the processor to decrypt the coupon information.

8. A configurable portable electronic communication device comprising:
a receiver configured to receive an electronic wireless transmission containing coupon information;
a processor electronically coupled to the receiver;
an electronic display coupled to the processor;
a memory containing a computer-readable program for generating a scannable coupon on the electronic display of the configurable portable electronic communication

device from the coupon information and including instructions for converting the scannable coupon from a first scannable barcode format to a second scannable barcode format.

9. The configurable portable electronic communication device of claim 24 wherein the electronic display is a dot-matrix liquid crystal display and the means for improving the first scan rate comprises having a strobe rate of the dot-matrix liquid crystal display sufficiently high to maintain sufficient contrast for electronic scanning of the scannable coupon shown on the dot-matrix liquid crystal display.

11. The configurable portable electronic communication device of claim 24 wherein the means for improving the first scan rate comprises a liquid crystal display having sufficient persistence to maintain sufficient contrast for electronic scanning of the scannable coupon shown on the liquid crystal display.

12. The configurable portable electronic communication device of claim 8 wherein the electronic display is a dot-matrix liquid crystal display having pixels capable of maintaining a contrast ratio of at least 1:4 between a light portion of a bar code and a dark portion of a bar code displayed on the electronic display between a first strobe signal and a second strobe signal to the pixels.

13. A configurable portable electronic communication device comprising:
a receiver configured to receive a wireless transmission containing coupon information;
a processor electronically coupled to the receiver;
a persistent dot-matrix liquid crystal display having a minimum nominal dimension of less than or equal to about 13 mils and an inter-pixel spacing of less than or equal to about 1.3 mils coupled to the processor;
a memory containing a computer-readable program, the processor reading the computer-readable program to generate a scannable coupon code from the coupon information on the electronic display.

24. The configurable portable electronic communication device of claim 8 further comprising means for improving the first scan rate of the scannable coupon from the electronic display of the configurable portable electronic communication device.

EVIDENCE APPENDIX

Statement Setting Forth Where In the Record the Following Evidence was Entered:

1. Baker, *Wireless Communication Using the IrDA® Standard Protocol*, Microchip Technology, Inc. (2003), submitted as Exhibit A in the amendment mailed January 24, 2005 (copy attached herewith).
2. *Introduction to IrDA*, ¶ 1, submitted as Exhibit B in the amendment mailed January 24, 2005 (copy attached herewith).
3. Richard D. Bushnell and Richard B. Meyers, *Getting Started with Bar Codes: A Systematic Guide*, 5th Ed., Quad II, Inc. (1999), cited by the Examiner in the Notice of References Cited attached to the non-final Office action (after RCE) mailed 03/18/2004 (copy attached herewith).

Wireless Communication Using the IrDA® Standard Protocol

By Bonnie C. Baker, Microchip Technology Inc.



ANALOG DESIGN NOTE

ADN006

The two most popular mediums in the wireless arena are Infrared (IR) and Radio Frequency (RF). When asked to develop a wireless system, you may be concerned about cost, ease-of-design, and distance requirements. IR technologies are better suited for short distance, low-to-medium data throughput, wireless communication channels. Two common types of IR technologies are currently in use. These are the TV Remote (TVR) and the IrDA (Infrared Data Association) standard protocol.

The lowest cost wireless connection technology is TVR. The trade-off with this technology is between distance and bit-rate. Usually this interface is also unidirectional. If a bidirectional, higher data bandwidth is required in your application, you may opt to design an IrDA system. This infrared communication standard has been defined by the IrDA industry-based group⁽¹⁾. This group has developed communication standards that are well suited for low-cost, short-range, point-to-point infrared channels. These types of channels operate over a wide range of speeds under a cross-platform environment. IrDA standards have been used to install over 300 million low-cost, short-range communication systems in laptops, printers, handheld PCs, and PDAs, to name a few.

An example of an IrDA standard embedded system is shown in Figure 1. In this system, the Primary device (PDA) searches for other IrDA standard devices. The Secondary device (Host Controller and MCP2150) will respond to queries from the Primary device.

The host controller controls the MCP2150 by sending and receiving data through its UART interface port. The MCP2150, which is positioned between the host controller UART device and infrared optical transceiver, decodes and encodes the signal.

The MCP2150 has two independent baud rates. One of the baud rates is for communication with the Primary device (PDA). The Primary device negotiates this baud rate with the MCP2150, as defined in the IrDA standard. The second baud rate is set with the two hardware pins, BAUD1 and BAUD0. This second baud rate is for communication with the host controller.

The IrDA standard is a network protocol and follows a layered approach in its definition. A model of the IrDA protocol stack is shown in Figure 2. These protocols deal with a manageable set of responsibilities and also supply needed capabilities to the layers above and below.

The MCP2150 is an IrDA Standard Protocol Stack Controller, which provides support for the IrDA standard protocol "stack" plus bit encoding/decoding.

One of the functions of the MCP2150 is to encode and decode the asynchronous serial data stream.

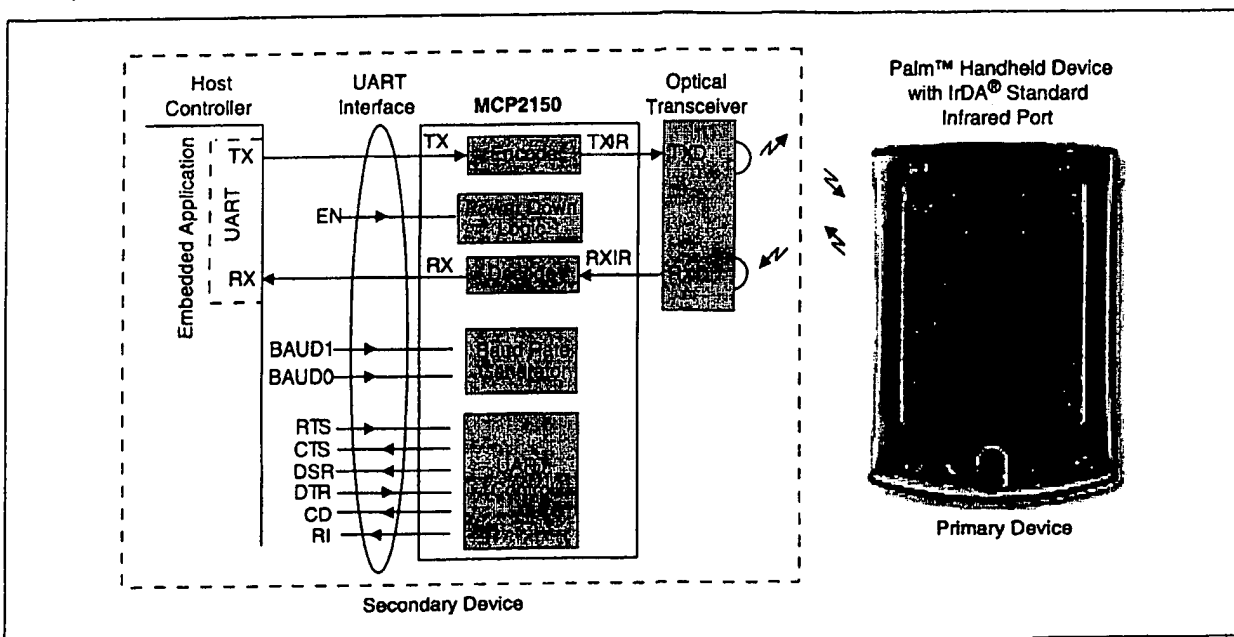


Figure 1. The Primary Device (PDA) sends data through the infrared interface to the MCP2150. The MCP2150 then decodes this data into the UART standard. After translation, the data is sent to the Host Controller through the UART interface. The Host Controller can also send data to the MCP2150 where the data is encoded and made ready for transmission to the Primary device.

IrTRAN-P	IrObex	IrLAN	IrCOMM ⁽¹⁾	IrMC
LM-IAS	Tiny Transport Protocol (Tiny TP)			
IR Link Management - Mux (IrLMP)				
IR Link Access - Mux (IrLAP)				
Asynchronous Serial IR (2, 3) (SIR) (9600 - 115200 Baud)		Synchronous Serial IR (1.15 MBaud)		Synchronous Fast IR (FIR) (4 MBaud)

Figure 2. This IrDA protocol stack has been defined by the IrDA industry-based group. Within the protocol stack data communications, details, as well as the data structures, are defined.

The encode/decode translation format is shown in Figures 3 and 4. Figure 3 shows how the received IR data from the PDA is decoded to UART-formatted data. Figure 4 demonstrates how data is taken from the Host Controller, into the MCP2150, and encoded in preparation of transmission to the PDA. The IrDA bit format is the NAND of the UART signal. The bits are inverted and high pulses are shortened in order to reduce the optics power consumption. The MCP2150 decodes the IR data, which is then handled by the protocol handler state machine. The protocol handler sends the appropriate data bytes to the Host Controller in UART-formatted serial data.

The MCP2150 replaces a wired serial connection with a wireless solution. The MCP2150 allows designers to add IrDA wireless connectivity to their embedded system designs easily and cost effectively. With this device, the host UART interface

allows easy connections to PC serial ports. Another product available is the MCP2155, which is best suited for serial port interfaces (ie., modems). In all cases, these point-to-point systems connect to devices of "higher intelligence", such as PCs, PDAs, etc.. This minimizes the cost of MCP215X-type devices. The MCP215X can also serve as a primary device in these point-to-point applications. Both devices provide support for the IrDA standard protocol "stack" plus bit encoding and decoding capability.

Another product in this family from Microchip is the MCP2140, which is an IrDA standard protocol stack controller with a fixed baud communication rate of 9600. Adding IR connectivity to cost-sensitive, high volume, embedded applications was not really feasible prior to the introduction of the MCP215X and MCP2140 parts. These parts remove the requirement of the system designer needing to implement the complex IrDA stack. Finally, the MCP2120 is an infrared encoder/decoder chip.

Sending data using IR light requires some hardware and specialized communication protocols. These protocol and hardware requirements are described, in detail, in the IrDA standard specifications. The encoding/decoding functionality of the MCP2150 is designed to be compatible with the physical layer component of the IrDA standard. This part of the standard is often referred to as "IrPHY". Additionally, the MCP2150 handles the specialized communication protocol, IrCOMM (9-wire "cooked" service class). A complete list of IrDA standard specifications is available on the IrDA website (www.irda.org).

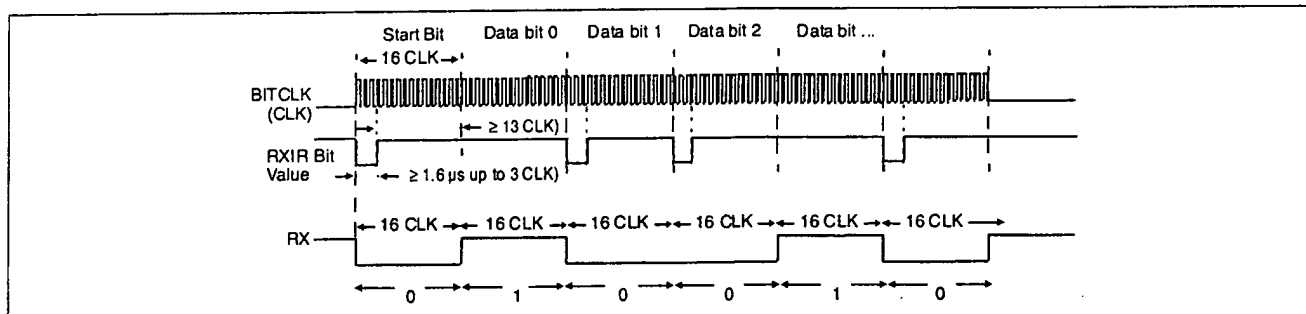


Figure 3. Bit Encoding

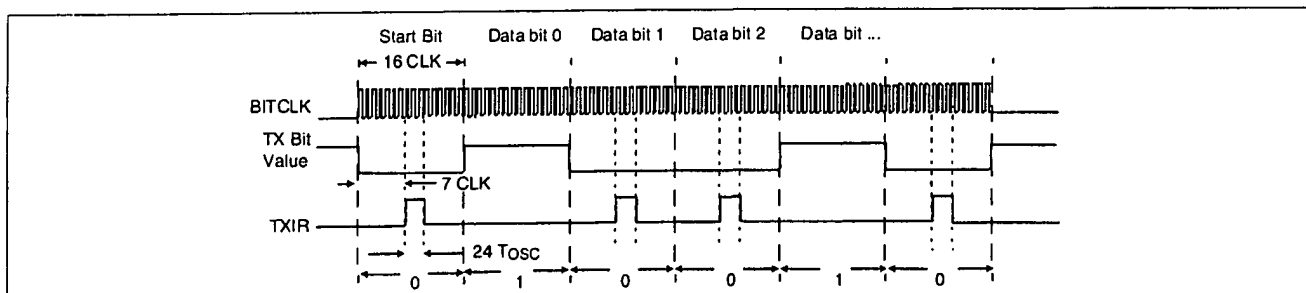


Figure 4. Bit Encoding

Recommend References:

- (1) www.irda.org - Trade Association for Defining Infrared Standards, IrDA System Protocol consortium web site.
AN858 - "Interfacing the MCP215X to a Host Controller", Palmer, Mark, Microchip Technology Inc.



For more information, please visit www.microchip.com

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Hardware Server



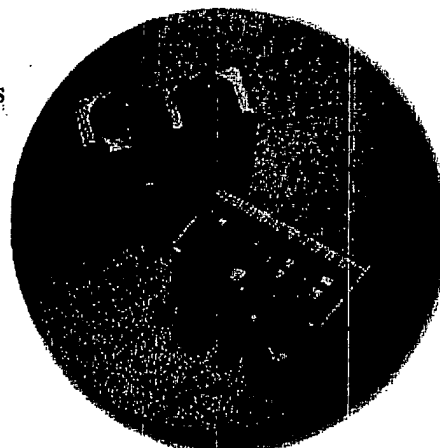
System	Articles	HW server	Links
Czech version	Documentations	Who are we	HW links
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Introduction to IrDA

IrDA is a standard defined by the [IrDA consortium](#) (Infrared Data Association). It specifies a way to wirelessly transfer data via infrared radiation. The IrDA specifications include standards for both the physical devices and the protocols they use to communicate with each other. The IrDA standards have arisen from the need to connect various mobile devices together. (Primary use for IrDA is to link notebooks or various personal communicators; however, even video cameras are sometimes equipped with an IrDA interface.)



IrDA devices communicate using infrared LED's. Wavelength used is 875 nm +/- production tolerance (around 30 nm). Many CCD cameras are sensitive to this wavelength too. Receivers utilize PIN photodiodes in generation mode (incoming light "kicks out" electrons. Signal continues into a filter. Only allowed frequencies for a particular IrDA modulation can pass through.) There is a direct relationship between the energy of the incoming radiation, and the charge that the optics part of the receiver generates.

Range and speed of IrDA

IrDA devices conforming to standards IrDA 1.0 and 1.1 work over distances up to 1.0m with BER (Bit Error Ratio - number of incorrectly transferred bits over number of correctly transferred bits) 10^{-9} and maximum level of surrounding illumination 10klux (daylight). Values are defined for a 15 degree deflection (off-alignment) of the receiver and the transmitter; output power for individual optical components is measured at up to 30 degrees. Directional transmitters (IR LEDs) for higher distances exist; however, they don't comply with the required 30 degree radiation angle.

Speeds for IrDA v. 1.0 range from 2400 to 115200 kbps. Pulse modulation with 3/16 of the length of the original duration of a bit is used. Data format is the same as for a serial port - asynchronously transmitted word, with a startbit at the beginning.

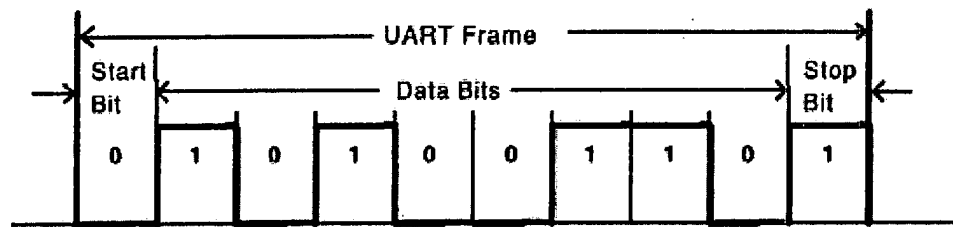


Figure 11a. UART Frame

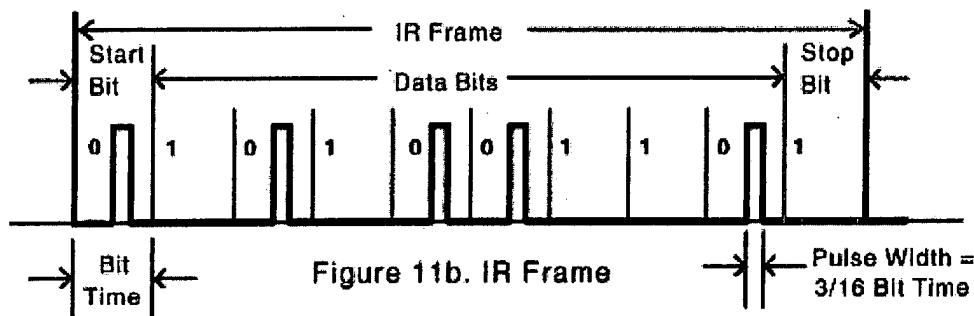


Figure 11b. IR Frame

Transmitter can use either 3/16 mark-to-space ratio for one bit, or a fixed length 1.63 μ s of each optical pulse, which would correspond to 115kbps. With fixed length and speed of 38400 bps, each bit would take 3 pulses.

WHO IS THIS CELEBRITY?

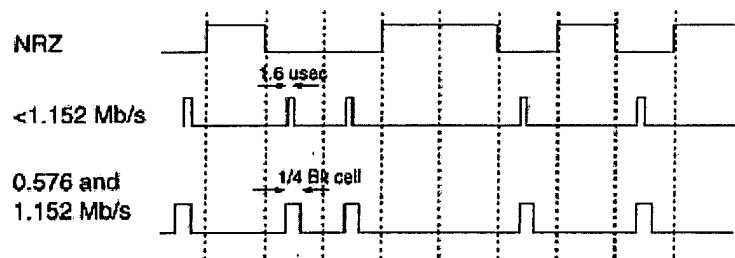
- AVKIL LAVIGNE
- PARIS HILTON
- JESSICA SIMPSON

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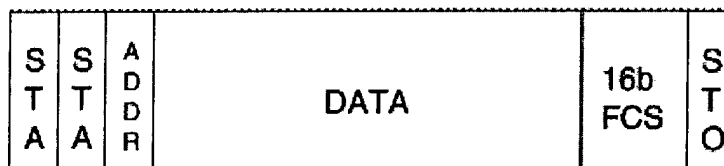
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In addition, IrDA v. 1.1 defines speeds 0.576 and 1.152 Mbps, with 1/4 mark-to-space ratio. At these speeds, the basic unit (packet) is transmitted synchronously, with a starting sequence at the beginning.

The NRZ signal in the figure is the original data signal without modulation.

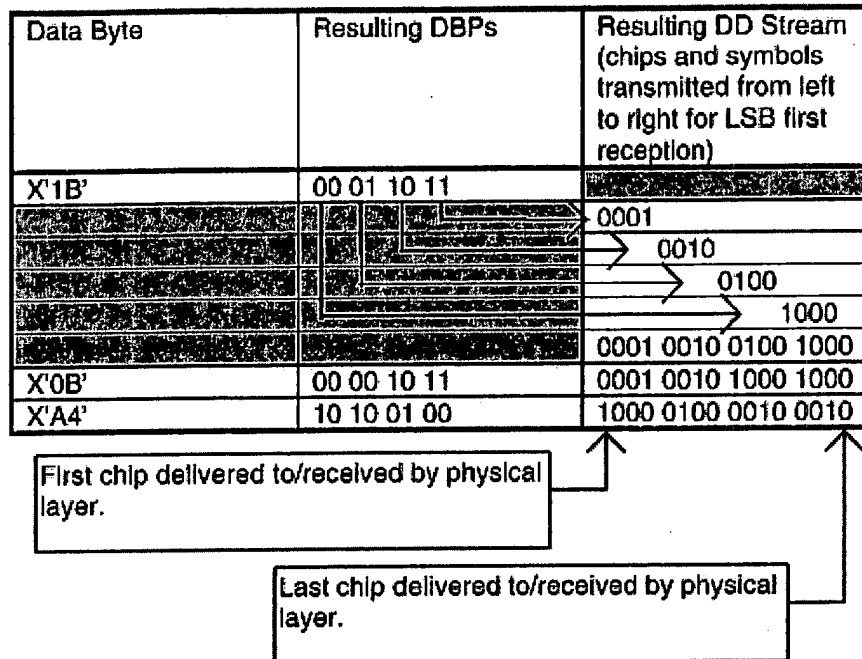


A packet consists of two start words followed by target address (IrDA devices are assigned numbers by the means of IrDA protocol, so they are able to unambiguously identify themselves), data, CRC-16 and a stop word. The whole packet (frame) including CRC-16 is generated by IrDA compatible chipset. Start and stop words cannot appear anywhere else in the data stream - start and stop words last 1.5 times the bit duration (6 times longer flash than usual).



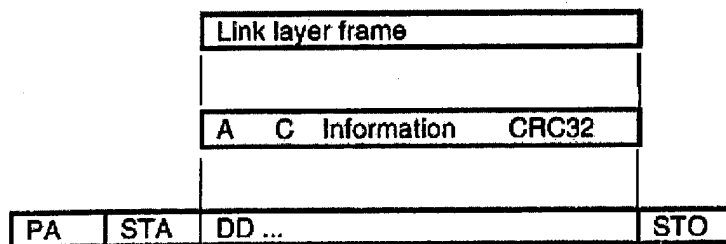
STA: Beginning Flag, 01111110 binary
ADDR: 8 bit Address Field
DATA: 8 bit Control Field plus up to 2045 = (2048 - 3) bytes Information Field
FCS: CCITT 16 bit CRC
STO: Ending Flag, 01111110 binary

For 4Mbps speed, so-called 4PPM modulation with 1/4 mark-to-space ratio is used. Two bits are encoded in a pulse within one of the four possible positions in time. So, information is carried by the pulse position, instead of pulse existence as in previous modulations. For example, bits 00 would be transmitted as a sequence 1000 (flash-nothing-nothing-nothing), bits 01 would be 0100, bits 11 would be send as 0001.



Main reason for the 4PPM modulation is the fact, that only half of the LED flashes are needed than in previous modulations; so, data can be transferred two times faster. Besides, it is easier for the receiver to maintain the level of surrounding illumination - with the 4PPM modulation, a constant number of pulses is received within a given time.

With bit speed of 4Mbps, the transmitter flashes at 2MHz rate. However, unlike 0.576 and 1.152 Mbps, 4Mbps packets use CRC-32 correction code. Most chipsets which can use this modulation can also generate CRC-32 by themselves, and check it when receiving - some chipsets (the ones I have studied) throw away incorrectly received frames.



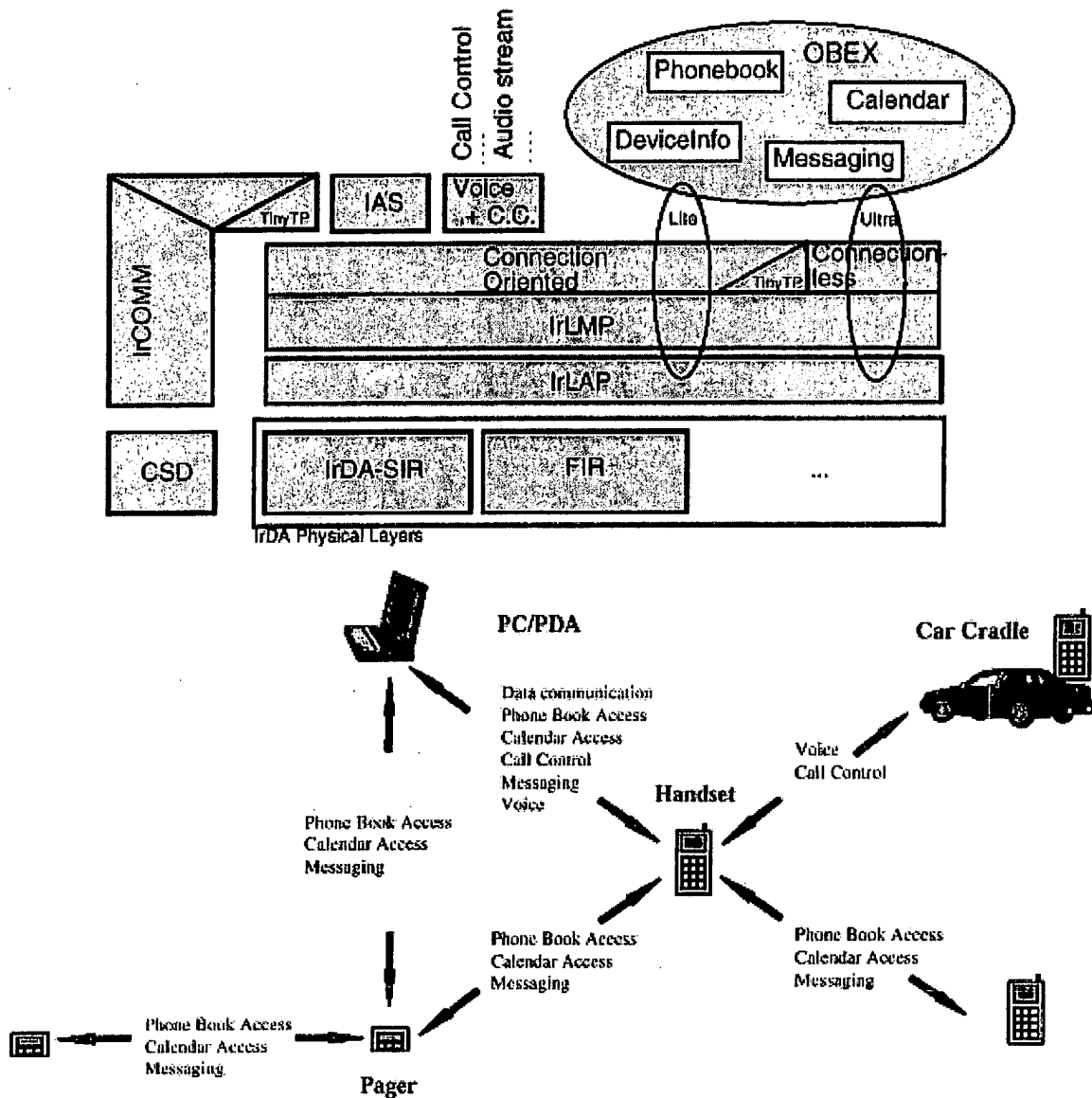
More, IrDA defines so-called low-power IrDA device, with range up to 20 cm and max. speed 115kbps (a.k.a. IrDA 1.0). Limiting factor for the range is the radiation intensity at the receiver in mW/cm^2 . This value is higher for faster bit speeds, for slower bit speeds (long pulses) the possible range increases. (This is not explicitly mentioned in the IrDA standards, but it correlates to the amount of incoming radiation - receiver thinks that short low-energy pulses are noise. For its filter to let them through, they need to be either longer, or their energy must be higher.)

Why a pulse modulation is used?

The receiver needs a way to distinguish between the surrounding illumination, noise, and received signal. For this purpose, it is useful to use the highest possible output power: higher power -> higher current in the receiver -> better signal-to-noise ratio. However, IR-LED's can't transmit at full power continuously over 100% of time. So, a pulse width of only 3/16 or 1/4 (mark-to-space ratio) of the total time for one bit is used. Now, the power can be up to 4 or 5 times the possible maximum power for LED's shining continuously. In addition, the transmission path does not carry the dc component (since the receiver continuously adapts itself to the surrounding illumination, and detects changes only.), thus it is necessary to use pulse modulation. Integrated IrDA transceivers (combined transmitting IR-LED and the receiving PIN photodiode) do have filters that eliminate noise other than the IrDA frequency range 2400-115200 bps and 0.576-4Mbps (2M flashes/s).

Protocols used by IrDA devices

- **IrDA Infrared Link Access Protocol (IrLAP)**
is a modification of the HDLC protocol reflecting the needs of IrDA communication. In general, it encapsulates the frames and makes sure the IrDA devices don't fight among themselves - in multi-device communication, there is only one primary device, others are secondary. Note that the communication is always half-duplex. Also, IrLAP describes how the devices establish connection, close it, and how are they going to be internally numbered. Connection starts at 9600 Bd; as soon as information about supported speeds is exchanged, logical channels (each controlled by a single primary device) are created.
- **IrDA Infrared Link Management Protocol (IrLMP)**
Since configuration of IrDA devices changes (you turn on your IrDA camera and put it next to your notebook), every device lets the others know about itself via the IrLMP protocol, which runs above IrLAP (IrLAP is a link protocol; I would compare it to the IP protocol, although address resolution is different). IrLMP's goal is to detect presence of devices offering a service, to check data flow, and to act as a multiplexer for configurations with more devices with different capabilities involved (compare to sockets in TCP/IP communication). Then, applications use the IrLMP layer to ask if a required device is within range, etc. However, this layer does not define a reliable way to create a channel (like in TCP); this is defined by IrDA Transport Protocols (Tiny TP).
- **IrDA Transport Protocols (Tiny TP)**
This layer manages virtual channels between devices, performs error corrections (lost packets, etc.), divides data into packets, and reassembles original data from packets. It is most similar to TCP.
- **IrDA Object Exchange Protocol (IrOBEX)**
is a simple protocol, which defines PUT and GET commands, thus allowing binary data transfer between devices. It is built on top of TinyTP. The standard defines what a packet must contain in order for the devices to recognize each other and communicate.
- **Extensions to IrOBEX for Ir Mobile Communications**
This extension of IrOBEX for mobile devices - handhelds, PDA, cellular phones - defines how to transfer informations pertaining to GSM network (address books, SMS, calendar, dialing control, digital voice transfer over IR, ...)



• IrTran-P (Infrared Transfer Picture) Specification

This definition was made up by big companies manufacturing digital cameras and specifies how to transfer pictures over the infrared interface. It is built on top of TinyIP, too.

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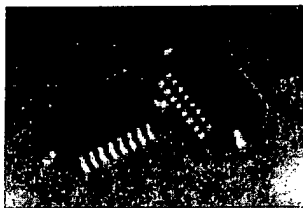
IrDA components

Here, I can describe my own experience with several components made by Hewlett Packard. They manufacture stand-alone IrDA transmitters (IR LED), receivers, as well as transceivers (a receiver with a transmitter in a single package). For speeds up to 115kbps (IrDA 1.0), HSDL-

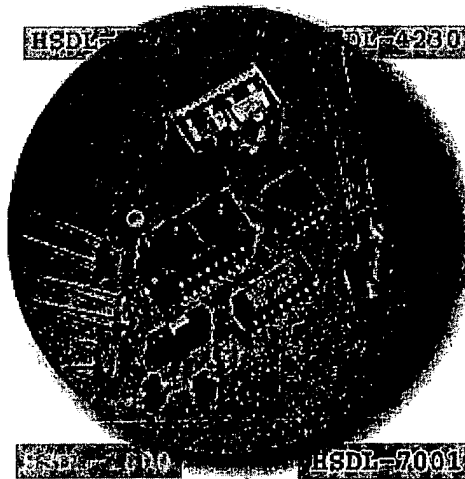
1000 transceiver is available. It works in half-duplex mode. It is very easy to use. Besides the transceiver itself, only several capacitors to filter the signal and to reduce noise are used. The capacitors need to be placed as close to the transceiver as possible, preferably within 0.7 cm (0.3 in). Since the HSDL-1000 is in a SMD package, it is a good idea to place it on a two-layer PCB, with ground copper area on the other side for shielding.

A faster version of the transceiver is labelled HSDL-1100. It supports FIR speeds (up to 4Mbit/s). However, I had problems with this one. In improper design, the FIR output easily becomes an oscillator. This part is also more sensitive to noise and unwanted feedbacks than the HSDL-1000 (FIR output only).

Other HP components available include IR LEDs HSDL-4230 and HSDL-4220. These LEDs withstand modulation speed up to 10Mbits, maximum current 0.5A (mark-to-space ratio 0.2) or 100mA (continuously). The only difference of the two versions in the HSDL-4200 family is their radiation angle (30 degrees for HSDL-4220, only 17 degrees for HSDL-4230).

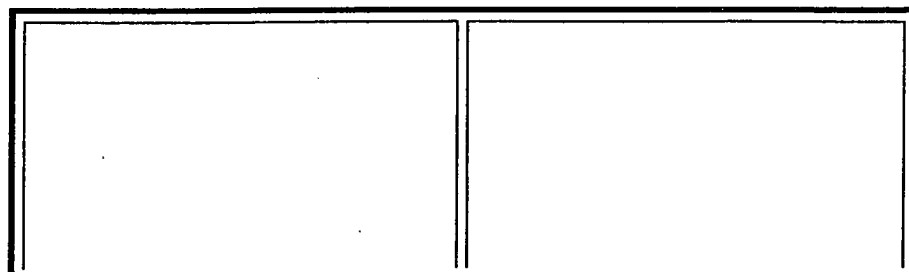


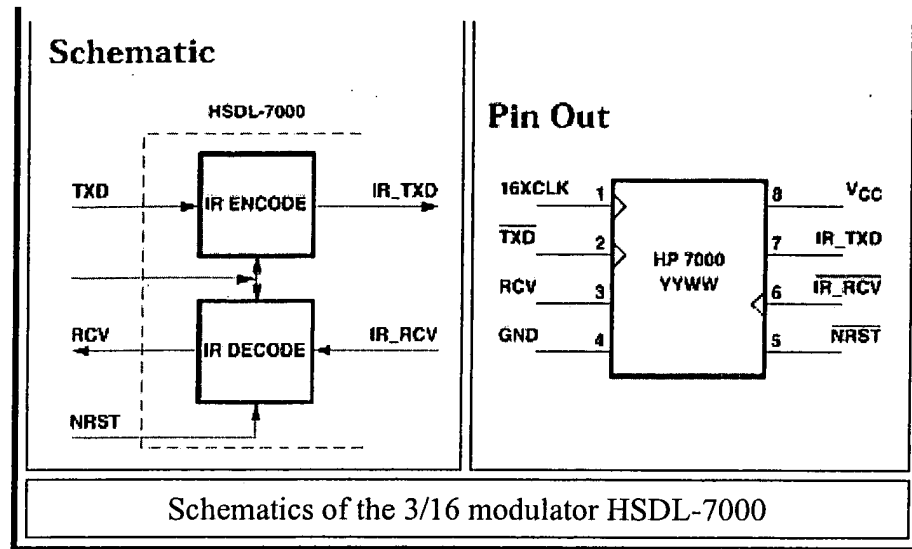
HSDL-1000



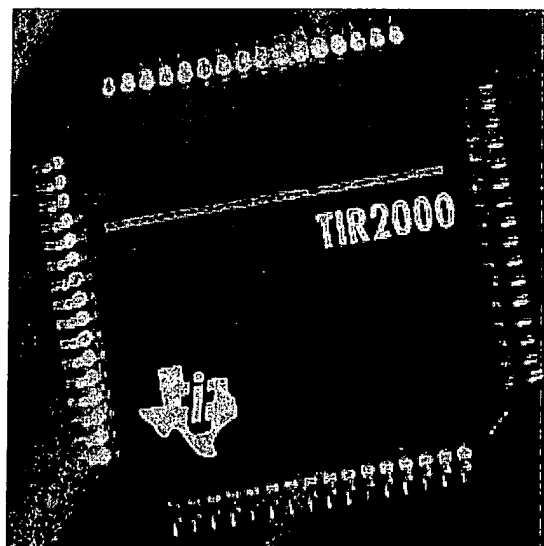
HSDL-1100

Also, Hewlett-Packard manufactures standalone PIN receivers as well as IrDA modulation encoders/decoders. Integrated encoder/decoder of IrDA 115kbps modulation can be ordered under part No. HSDL-7000. It is an integrated circuits with 8 pins. In addition to power, serial port transmit/receive, a 16-times the bit frequency oscillator needs to be connected to it (for 115kbps, required frequency is $115200 \times 16 = 1.8432$ MHz). I had a chance to try out encoder/decoder HSDL-7001; however, it offers only a few additional functions (e.g. integrated frequency divider, or a possibility to connect a passive XTAL directly to its inputs). In addition, the integrated frequency divider works for IR input only, not for the output.





Of course, Hewlett-Packard is not the only manufacturer of IrDA components. For example, Texas Instruments manufactures UART's labeled TIR1000 and TIR2000. The TIR2000 incorporates a driver for the 4Mbps modulation (uses DMA mode). National Semiconductors produce their own versions. And so on. In the Czech Republic, UARTs by TI and NS circuits are probably the most common ones.



Links to manufacturers of IrDA components

Here are links to WWW pages of different IrDA devices manufacturers.

IBM

Hewlett Packard

[HP ir chip directory](#)

[HP ir center](#)

[Texas Instruments](#)

[National Semiconductor PC87109](#)

[Vishay-Telefunken \(drive Temic\) Nemecko](#)

[Vishay-Telefunken \(drive Temic\) USA](#)

[Linux support for IrDA](#)

I don't have to mention IrDA protocol support at Micro\$oft. However, here is a link to [The Linux/IR Project](#), whose objective is to incorporate IrDA protocols into Linux kernel. Source codes are tested on development Linux kernels (2.1.xxx), (2.1.xxx)

Practical experiences

When playing with the IrDA data transfer, our goal was far beyond the 1 meter range specified by the IrDA standard. Using IR LED's with half the radiation angle (17 degrees, instead of 30), we could go up to 4 meters without additional optics at 115 kbps bit rate. Beyond a certain distance, the receiver tends to loose individual pulses, or decrease their amplitude and duration (after all, it is an analog circuit although its output is supposed to be "digital"). For greater distances (our requirement was to transfer data over a 200m distance), additional optics is needed. We have found that, if speed is decreased 4 times, distance can be increased two times. This confirms the thesis about pulse detection via certain amount of energy passing through the filter in the receiver.

Since our goal was to connect two Linux boxes and run ppp protocol over a serial line, we have created additional logic (1 gate ;). It would continuously send pulses while DTR signal remained inactive, and thus signal a 'hang-up' to the other side. A side effect is that if the serial cable from the computer to the IrDA link is pulled out, the circuit starts sending pulses - as if the computer had hanged up via the DTR signal. This can be used in debugging process - finding signal. More, transmitter can be connected to the receiver on one side, creating a several hundred meters long loopback - ideal for checking connection quality in both directions, without the need to run there and back.

With the additional optics, we have found after some time that for distances less than about 80 meters (115 kBd speed), full-duplex mode cannot be used since the transmitted beam reflects back and creates echos. The same applies whenever there is a reflective object in the signal path - a window, for instance.

Alignment of the link is critical. The mount has to be very firm, and able to fine-point the components, so they are co-axial. Reasonable bit errors can be achieved if the link is aligned within about one meter (distance 200m - corresponds to approx. one half of a degree angle). Alignment is critical for the transmitter, not the receiver. Our best result was about 0.0006% faulty packets (MTU=296 bytes, ping packet length 64 bytes), in other words, about one packet out of 170000 packets is bad. The statistics for the other direction were about four times worse - bad alignment. Normal rain is obviously not an issue (it has been raining for two days already), problems arise with heavy rain or direct sunshine to the optics.

```
ppp0      Link encap:Point-to-Point Protocol

          inet addr:10.1.2.4  P-t-P:10.1.1.4  Mask:255.255.255.0
```

UP POINTOPOINT RUNNING MTU:296 Metric:1

RX packets:49724542 errors:233 dropped:233 overruns:0 frame:0

TX packets:49625500 errors:0 dropped:0 overruns:0 carrier:0 coll:0

This is our ppp line statistics, 115kbps, full duplex, rain, 200m

ppp0 Link encap:Point-to-Point Protocol

inet addr:10.1.2.4 P-t-P:10.1.1.4 Mask:255.255.255.0

UP POINTOPOINT RUNNING MTU:296 Metric:1

RX packets:25255596 errors:18 dropped:18 overruns:0 frame:0

TX packets:25276229 errors:0 dropped:0 overruns:0 carrier:0 coll:0

and this one with good weather and a different setting (again 200m)

Pictures in the text are from WWW pages of Hewlett Packard, Texas Instruments, and bitmap version of pdf documents by IrDA consortium.

For pricing information of IrDA components, please contact your local electronics components dealer.

Written by: Vladimir Myslik

Revised by: Jan Rehak

English translation by: Joe Hlavac

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Richard D. Bushnell
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5th Edition

**By
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and
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Whether you are employing an industry standard or developing a system from scratch, you will need to know all these elements in order to **procure** equipment and **implement** a system. This information should be readily at hand.

Form 5-1 is designed to be used for easy reference. Fill it in and keep it handy. If you don't have an industry standard, determine your information needs and then select one of the standard symbologies specified by AIM. In that event, you should employ Form 5-2, and then fill in the appropriate information on Form 5-1.

If you are fortunate enough to be dealing with finished goods in an industry with a specification, then what you must do is see **how the information contained in that symbol can be used to increase productivity, provide timely and accurate information, and enhance electronic communication.**

The label requirements must also be taken into account. You must evaluate the application in terms of **label life**. **High temperature** may discolor some types of labels and may **alter adhesive properties**. Shelf labels may be exposed to **cleaning fluids** which can destroy the ink. **Moisture** is always a factor. **The more often a label needs to be read**, the greater the danger of destruction, especially if contact is required between the scanner and the label. All of these factors should be evaluated, and of course price must be considered. Form 5-3 will be helpful when considering label type and volume.

Standards Applied by Industry

In simple terms, a "symbology standard" explains how the numbers and letters are represented in an array of bars and spaces. The pattern of bars and spaces is called a symbology. A symbology, i.e. Code 39, represents the number 1 with a unique pattern of bars and spaces. This is different from the pattern of bars and spaces used in a symbology called Code 128.



On the other hand, an "application standard" is concerned with how data is represented, what data elements are contained on a label and how product numbers, manufacturers and serial numbers are to be structured. Users must understand the information structure so they can develop applications and software to provide their managers better control over their businesses. Frequently, in a rush to

determine whether bar codes can be used within a company, users tend to confuse a symbology standard and an application standard.

Another problem comes from the belief that, because their industry uses a particular symbology or application standard (i.e. Code 39 and the AIAG Primary Metal Application Standard), they must use those for internal purposes. This is incorrect. Every organization has a different method of operation and will have different management systems and application needs.

Companies wishing to use bar codes for internal purposes may, therefore, determine, based on their own application requirements, that a different symbology is more appropriate for internal use.

Industry-specific application standards play a necessary role in business to business communication. It is extremely important that you find out what application standards apply to your trading partners. You may find that some require one standard, while others require a different one.

Most general trade items sold through industrial distribution channels are related to the Uniform Code Council (UCC) Industrial Commercial Guidelines (contact UCC @ 1-800-543-8137). This concept of identification for general trade is based on the idea that primary importance is place on **who manufactured the item**, no matter who buys or distributes it. Anyone in the distribution channel can use the bar code to identify the manufacturer. **General trade items are manufacturer-specific, not buyer-specific.**

Other application standards like AIAG are shipment-, order- or buyer-specific. They require specific labeling and, in some situations, the use of the buyer's part identification on the packaging. They may even require the use of the buyer assigned manufacturer identification number.

It is also necessary to determine the method used to identify the elements of information if more than one is contained on a label. Two methods exist. If you are using the UCC scheme with trading partners, you will employ Application Identifiers. If you have broader needs, you may find your solution in the use of the FACT Data Identifiers. The data element descriptions and the cross-mapping are explained in Appendix 9. A partial list of organizations developing Application Standards is found in Appendix 6, Question 14.





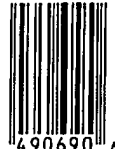

Information Use

After you reviewed your system by function as described in Section 3 (Form 3-1), you may have selected one or several areas where you would like to use bar codes. Now you should contemplate how the information contained in the bar code will be employed. This will help validate your symbol selection.

The three most basic questions to be answered are: What is the system to do? How will the information contained in the bar code be used? With what frequency

Figure 5-C

SYMBOL SIZE COMPARISON

Interleaved 2 of 5 (I 2 of 5)	 123456	"X" = .010 inch wide/narrow ratio 3:1
Code 39	 123456	"X" = .010 inch wide/narrow ratio 3:1
CODABAR	 123456	Narrow Bar = .0065 inch wide/narrow ratio N/A
Code 128 (C)	 123456	Narrow Bar = .010 inch wide/narrow ratio N/A
UPC-E	 0 490690 6	Narrow Bar = .013 inch wide/narrow ratio N/A
UPC-A	 0 71589 81230 8	Narrow Bar = .013 inch wide/narrow ratio N/A

(Symbols courtesy of COMPUTYPE, INC.)

1. **Interleaved 2 of 5**

The Interleaved 2 of 5 symbology is designed for numeric data only and offers a relatively high character density within the symbol. No check characters are specified for this symbology and the code has been designed for applications in which all symbols have a fixed number of characters. The potential for read errors is increased if symbols with a varying number of characters must be read. The user is advised that a check digit for validation is always a good idea. A check character is mandatory if variable length messages are employed.

Sample Represents:

6 Characters (123456), "X" = .010, W/N ratio 3:1

Full details are included in AIM USS-I2/5.



2. **Code 39**

The Code 39 symbology permits encoding of upper-case alpha characters plus the numeric digits. This expanded character set requires more space per character than Interleaved 2 of 5, resulting in significantly lower character densities in the symbol. No check digit is required in Code 39 symbology, although one can be employed.

Sample Represents:

6 Characters (123456), "X" = .010, W/N ratio 3:1

Full details are included in AIM USS-39.



3. **Codabar**

The Codabar symbology offers six special characters plus the numeric digits. Character densities for this symbology lie between those for Interleaved 2 of 5 and Code 39. Codabar also offers four different start-and-stop characters which can be used to define the context of the data within the label. No check digits are required.

Sample Represents:

6 Characters (123456), "X" = .0065

Full details are included in AIM USS-CODABAR.



4. **Code 128**

Code 128 offers the full 128 ASCII character subset, featuring very high density for the numerics. This symbology also features code select characters plus three different start characters for data context definition. One check character is required in this symbology. It offers a significant feature in that it provides

higher data density than Code 39 and has an alpha-only representation (Type A), a mixed representation (Type B), and a numeric-only (Type C).

Sample Represents

6 Characters , Type C, "X" = .010

Full details are included in AIM USS-128.



5. Universal Product Code (UPC), European Article Numbering (EAN)

Originally developed for the food industry, the UPC/EAN numeric encoding symbology was developed to permit reliable reading of numeric bar codes printed on a wide variety of forms. Use of the UPC/EAN symbology has expanded into almost all forms of retailing - food and non-food. Standard forms of this symbol include eight digit (Version E) , twelve digit (UPC-A) and thirteen digit (EAN) format. Current scanning equipment will usually expand the scanned symbol into thirteen digits regardless of the number of digits scanned. A single check digit is always included in the symbol. A number system digit is also included. Examples are "X" = .013". **This code is not intended for industrial use.**

Sample Represents

12 Characters (012345123450), "X" = .013



Two Dimension Bar Codes

The name of this class of symbologies comes from the fact that information is contained in a matrix. So the scanning requires both an x and y coordinate; in other words, "two" dimensions. The traditional Auto/ID concept uses a unique identification number or name carried in a linear bar code (one dimension). When it is scanned, that name or number is taken into a computer (electronic data base) and used to access a file containing additional information. For example, at the grocery store, the scanner reads the bar code on the product. The identification number is then fed to a computer which matches that product number against a file to provide price information which is displayed on the cash register and added to your cash register receipt. That file containing the price carries the inventory on hand which is amended as the item is scanned and removed from inventory. The Federal Express Air Bill has a bar code in the upper right hand corner. That bar code provides unique identification for the package and is used by Federal Express to track the package as it moves through the system.

Auto-discrimination of Symbologies

A growing trend among bar code equipment manufacturers is to provide scanners which read more than one symbology. **The ability to read different symbologies interchangeably is called auto-discrimination.** Labels may carry more than one symbol or merchandise from different sources may carry different symbologies.

In general, it is possible to obtain reading equipment which can auto-discriminate all of the common symbologies discussed above.

The utility of auto-discriminating readers is becoming more important as the use of bar code labels expands. Several associations have developed guidelines which call for the use of I 2 of 5 and Code 39 interchangeably; Code 128 is also becoming more prevalent. **To ensure accurate reading, the I 2 of 5 symbol will be a fixed number of characters with a calculated check digit.**

There is always a statistical possibility of a substitution error in the data. The possibility of this occurrence may increase when different symbologies are to be decoded. It is always important to provide high- quality printing, but this becomes even more critical when auto-discrimination is to be employed.

Effect of "X" Dimension on Symbologies

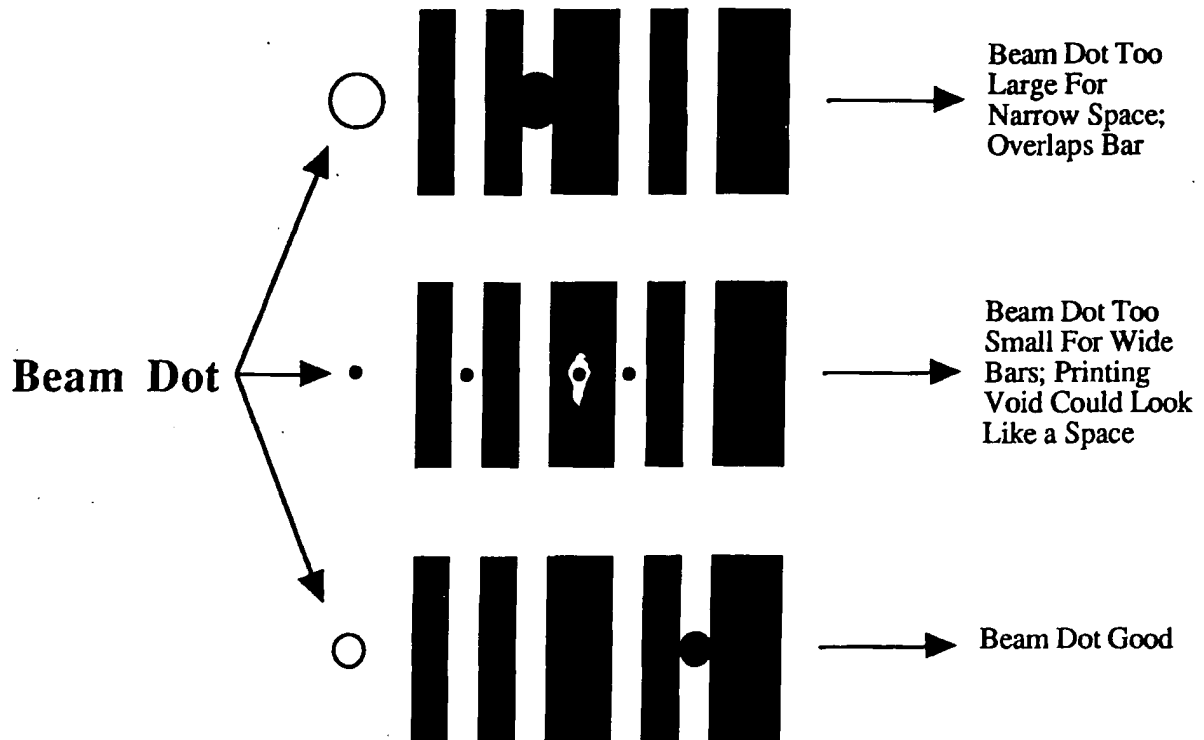
The minimum symbol size can be determined by the arithmetic described in Chart 5-A. Different symbologies use different formulas to calculate symbol size. The specification for each symbol should include the formula. If you need to be more precise than the information shown in Chart 5-B, consult the symbology specification available through your trade association or AIM.

The one element which will most impact the size of the label is the narrow bar or "X". There are two ways that "X" will be established. One is by the printing technique. For example: If you can use letter press, laser or thermal printing, then a .0075-inch "X" is possible. But if you require multipart forms, another printing technique (dot matrix) will be needed. The dot matrix equipment may only supply a .011-inch "X", so the label would be about 50% larger. Other factors which affect symbol size are size of the intercharacter gap, and the ratio of wide-to-narrow bar/space widths.

The second way in which the "X" can be established is as a result of the scanning dynamics. For example, the material handling requirement may dictate a variation of 24 inches from the box's close position to the far position. This is called a 24-inch depth of field, and for the bar code reader to operate over that range, it may require a .030-inch "X". Section 6 explains more about scanning dynamics.

Figure 6-B

LIGHT BEAM DOT MUST BE FOCUSED



Symbol and Scanner Resolution

To harmonize the scanning, printing, and symbology elements, the system planner/designer should determine whether the label's size and distance will require or permit a low, medium, or high-density symbol. The higher the density, the more characters can be encoded per inch. Keep in mind that the narrower the bars, the more difficult they are to read over distance (see Figure 6-C). For more information, refer to the Sixth Commandment in Appendix 4.

Resolution	Narrow Bar/Space
Low Resolution	Greater than .020"
Medium Resolution	.010" to .020"
High Resolution	.0075" to .010"
Ultra High Resolution	Less than .0075"

The amount of space required for the data is also related to the symbol and its construction.

The amount of space required for the data is also related to the symbol and its construction.

Read Rates and Errors

Scanning performance is based on the interrelationship of the scanning device, its technique, and the symbol's density and printing technique. The "bottom line" is how successful the operator is at an attempt to scan a symbol. This is called "first-read" rate, and is presented as a percentage. Typically, first-read rates of 98% are desirable and attainable. This is purely a matter of mechanics for automatic scanning applications, but is more involved for hand-held scanners due to operator interaction. The operator's first-read rate does depend to some degree on his familiarity with the equipment, although most operators find that the initial technique takes less than ten minutes to master and a day of scanning generally makes an operator an expert. If trained operators are experiencing difficulty, their troubles may be related to printing or other problems. See Problem Check List on Chart 6-T.

A common way to evaluate scanning (evaluate a label, scanner, and/or operator) is to determine the "first pass read rate (FPRR)" and the "second pass read rate (SPRR)".

To measure FPRR, scan 100 labels and record the number scanned (good read or "beep"). If 80 are read out of 100, the FPRR is said to be 80%. If you scan the 20 which failed for a second time, and 19 of these 20 give a good read indication, the SPRR is said to be 95%.

Many people feel that a raw value for FPRR of 95% or higher is required. Different environments (applications) can tolerate different FPRR's. Look at several applications:

- In a time and attendance application where several hundred employees are required to "clock-out" at the end of a shift at a few bar code stations, a virtual 100% FPRR of the bar coded employee badge is highly desirable.
- Where an operator is hand-scanning 2 to 3 labels per minute, an FPRR of 90-95% and SPRR of 99% is suitable.
- Where an operator may scan 2-6 symbols per hour, an FPRR of 80% and an SPRR of 95% is very satisfactory. This latter situation occurs with a factory labor data collection application.

Another term commonly referred to when evaluating scanning is "substitution error." This is the situation in which the scanner reports an erroneous number. For example, if the number which was encoded was 1234 and









that symbol was reported as 1235, this would be a substitution error. The statistical probability of this occurring with Code 39 is 1 in 3,000,000 characters read. With a fixed-length Interleaved 2 of 5 symbol, employing a calculated check digit, the statistical probability approaches the same number. The possibility of error occurs more frequently with poor printing, underscoring the interdependency of the printed symbol and the scanning technique (see Figure 6-D).

Scanning Equipment

Scanners are categorized as hand-held, stationary mount, contact, or noncontact. Further characterizations are wavelength of light, resolution, depth of field, and fixed-beam or moving-beam. The type of application will direct you to the correct type of scanner, if you use some common sense. When you have selected a scanner type, then review several manufacturers' equipment using Form 6-1 and the requirements developed in 5-1 and 5-2.

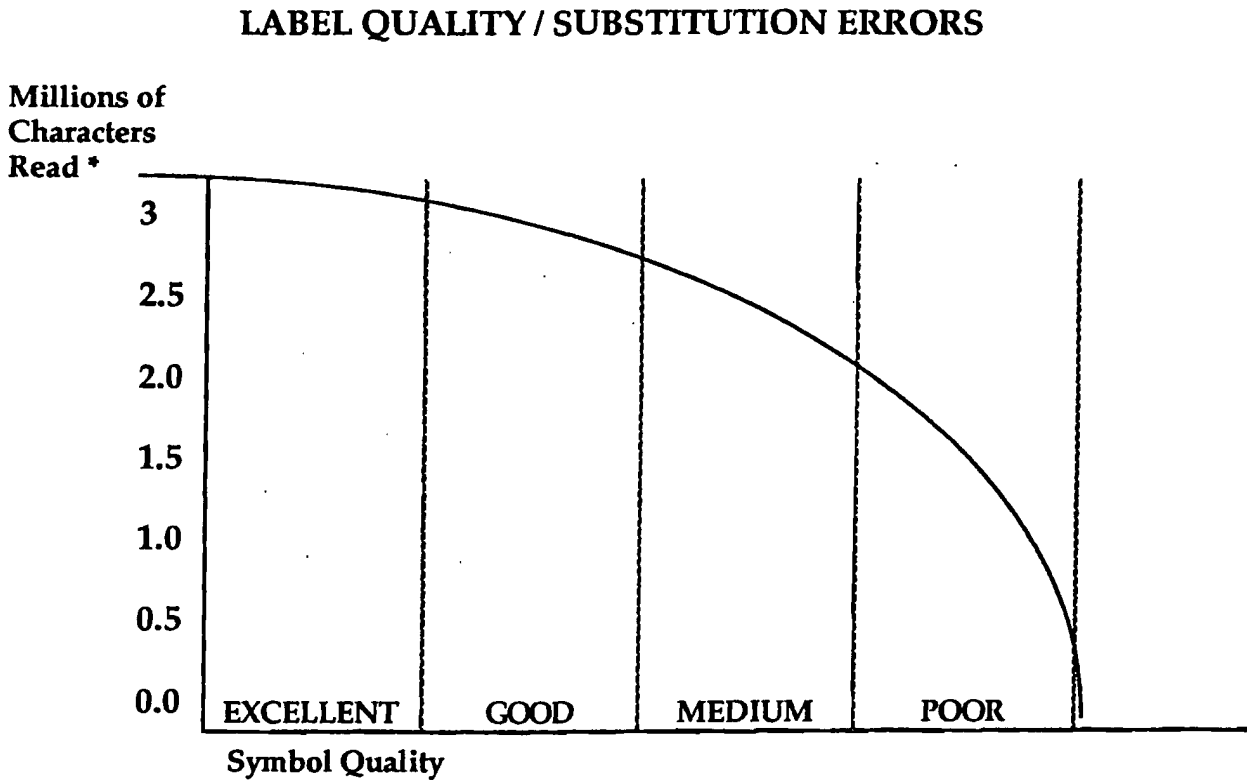
Figure 6-C

CODE 39 SYMBOL SIZE
Wide/Narrow Ratio 3:1, Data = 1234

"X" Dimension	Symbol Size	Characters Per Inch
.008		7.8
.009		6.9
.010		6.2
.0115		5.4
.012		5.2
.014		4.4
.018		3.4
.021		2.9

(Bar Code symbols courtesy of COMPUTYPE, INC.)

Figure 6-D



The number of characters read before a substitution error may occur is directly related to the symbol quality. Poor printing or damaged labels could result in substitution errors. 3 million, or more, characters may be read before a substitution error may occur when label quality is excellent. Poor printing may cause substitutions at a lesser number. Other factors such as check digits help to avoid errors.

* Data is approximate, based on general consensus.

TEN COMMANDMENTS OF BAR CODING

Bar coding is a technology that has been used for decades. Although the first major thrust of implementation took place in the retail food industry, other sectors are now enjoying benefits. The successful use of bar coding involves many different ingredients. The primary objective of the *TEN COMMANDMENTS of BAR CODING* is to summarize the various factors into simple understandable terms. If this foundation is understood and used properly, there is a very high probability of successful implementation.

This discussion is based on real-world experiences gained from visits to multiple user sites. These practical tips will focus primarily on the most widely used Code 39, Code 128 and UPC/EAN symbologies. However, much of this material will also apply to the more than 60 symbologies that have been invented and used at one time or another.

1st COMMANDMENT: Low Density

As the implementation process expands into multiple applications, a wide variety of media will be generated. Small and large labels and forms in varying densities will be available for scanning. Density or Characters Per Inch (CPI) will directly result from the size of narrow plus wide bars and spaces (elements) used to configure each symbol. The wider the bars/spaces, the lower the density. Narrower bars/spaces will result in higher density but can also be more difficult to scan depending upon the environment.

The majority of applications will use bar coded media with an "X" factor (narrowest element) that ranges from .0075" (7.5 mils) to .020" (20 mils). The resulting density from this variable is portrayed in Figure 1 for Codes 39, 128 plus UPC/EAN.

Characters Per Inch (CPI)

SYMBOL:	"X" Narrow Element Size:			
	.0075"	.010"	.013"	.020"
Code 39	10-8	7-6	6-5	4-3
Code 128 (A/N)	12.1	9.1	7.0	4.6
Code 128 (N)	24.2	18.2	14.0	9.1
UPC/EAN	n/a	12.0	10.0	5.0

Figure 1

Each application will dictate the symbology to be used along with the appropriate density. The amount of space available to print the symbol is often the determining factor.

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Scanners look at bar coded media in a similar way as a human. Figure 2 illustrates the word "symbol" encoded in low and high density patterns. Note how much easier it is to determine the clarity of bar/space size in the low density version as opposed to the high density sample. Scanners will look at the media in a very similar way. Scanning can become complex when using high density media that has been contaminated with foreign matter like dirt, grease, etc. With low density media, there is less of a negative impact.

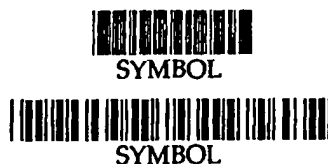


Figure 2

KEY POINT: *The scanner looks at the pattern of bars and spaces in a similar manner as the human eye. Wider bars/spaces are easier to interpret and less subject to hostile conditions like voids and specks of dirt, etc. For the most effective and reliable scanning, implement with the lowest possible density. There will be applications that demand the use of high density media. In these situations, more sophisticated and/or expensive scanning solutions may be required that will provide satisfactory results.*

2nd COMMANDMENT: Wide-to-Narrow Element Ratio

In addition to other factors, every linear symbology includes a series of narrow and wide bars/spaces (elements) that make up the final configuration. As can be seen in Figure 3, there are four different element widths for Code 128 and UPC/EAN. However, in the case of Code 39, there is a user option that determines the width of the wide element. Depending on the "X" factor (size of narrowest element), the dimension of the wide element can be in a range of 2 to 3 times "X". Also, as a result of the printing process, bars and spaces can be thicker or thinner than intended. This variation is satisfactory as long as each element is within certain tolerance ranges.

WIDE-to-NARROW ELEMENT RATIO	
SYMBOL	ELEMENT RATIOS
Code 39	Variable - Narrow plus 2:1 to 3:1
Code 128	Fixed - Narrow plus 2:1 and 3:1 and 4:1
UPC/EAN	Fixed - Narrow plus 2:1 and 3:1 and 4:1

Figure 3

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Figure 4 portrays a hypothetical condition when using Code 39. Note the impact of a 30% growth in the narrow elements (from a nominal of .010 inches to .013 inches) and an equal amount of shrinkage in the wide elements (from a nominal of .020 inches to .014 inches for the 2:1 ratio and a shrinkage for the 3:1 ratio from .030 inches to .021 inches).

BAR/SPACE	NOMINAL DIMENSION	30% GROWTH/SHRINKAGE
Narrow ("X" Factor)	.010"	.013" (+30%)
Wide	2:1	.020" .014" (- 30%)
Wide	3:1	.030" .021" (- 30%)

Figure 4

With the use of a 2 to 1 wide-to-narrow element ratio, the narrow and wide elements are virtually the same. A scanner is unable to distinguish the difference. However, there remains a considerable delta when using the 3 to 1 ratio thus allowing for a far greater margin for a printing error.

KEY POINT: *Although some Code 39 applications will dictate the use of a low ratio, the most effective and reliable scanning takes place with a wide-to-narrow element ratio as close to 3 to 1 as possible. Code 128 and UPC/EAN are configured with four specific wide-to-narrow ratios so there is no option with those symbologies.*

3rd COMMANDMENT: Carbon Ink

Bar code scanning takes place by focusing light on a pattern of bars and spaces. The bars should absorb most of the light and the spaces should reflect most of the light back to the scanning device. The two primary ways of measuring the correct absorption and reflection factors is by Print Contrast Signal (PCS) or Minimum Reflectance Difference (MRD). The result of these calculations must be substantial enough that scanners are able to properly distinguish between bars and spaces.

Bar coded media produced with carbon-based inks normally insure a higher PCS or MRD than alcohol-based or dye-based inks thus providing better scanning characteristics. All types of scanners can accommodate carbon-based inks. However, infrared scanners are unable to read media produced with alcohol-based or dye-based inks.

Using carbon-based ink to create bar code symbols may prove to be a significant asset when the media is used in hostile operating environments. Infrared scanners can often read these symbols even when they are contaminated by marks from ball point pens, dirt or other foreign matter.

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KEY POINT: *Although not mandatory, the use of carbon-based inks will often provide superior scanning performance. Some hostile conditions will dictate this technique. A number of industry standards require the use of carbon-based media. A major exception is the retail food industry. In this case, the printing of UPC symbols on product packages with carbon inks would add excessive cost to the process.*

4th COMMANDMENT: Media

All too often this topic is a step-child, the last to get recognition in the implementation process. Media substrate and adhesive backing problems can and should be avoided. The challenges are relatively simple.

Opacity must be sufficient to prevent background surfaces from interfering with the scanners ability to read the media. If a dark background shows through a label, the scanner may interpret some spaces as bars. This condition can readily happen when a white adhesive label is placed on a dark surface.

When symbols are being produced on dot-matrix printers, the use of OCR quality carbon ribbons is recommended. This is particularly true if they are to be scanned with contact wands or light pens. Carbon ribbons will reduce the head life on these kinds of printers. To avoid this problem, install heads with carbon tungsten tips.

If direct thermal printer labels are going to be exposed to excessive heat or ultra violet lighting conditions for nearly any length of time, the special paper required for these printers should be tested. Extended exposure will either fade the entire surface of the label or make it so dark that there is not enough PCS or MRD for scanning.

When thermal transfer produced media must be scanned many times by contact wands, the encoded bars tend to be scraped off the surface. Technological developments are changing this dilemma. As a result, there are many good products. If using those that are not as advanced, it may be necessary to add a coating like mylar, etc., to protect the surface when utilizing contact scanners. Fundamental to the success of this printing technique is the marriage of compatible inks, ribbons and label substrates.

Personal identification badges should use specifically designed materials that are able to withstand years of use and abuse. Proper production techniques and thickness of this type of document will make it compatible with nearly all types of scanners.

Adhesive labels are one of the most extensively used types of media. A wide

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variety of adhesive backings are available for different applications and environments ranging from labels that can be readily removed to ones that will self-destruct when removal is attempted. Adhesive properties vary considerably depending upon surfaces onto which they will be placed and to temperature and humidity conditions that they will be exposed.

Bar coded media that will be exposed to hostile conditions, like humidity and temperature extremes, should be pre-tested before a final substrate decision is made.

KEY POINT: Rarely has an application been found for which there is no right media solution. Define the label requirements including shelf life (after printing), the number of times to be scanned and the scanning environment. Then seek proper counsel with a reputable source who uses the latest techniques and provides guidance on the proper marriage of various media supplies.

5th COMMANDMENT: Verification

A definition of the word verify in Webster's dictionary is "to test or check the accuracy or correctness of, as by investigation, comparison with a standard, or reference to the facts".

The issue at hand is basic. Bar coded media is being generated by the billions everyday. It is used as a source document for data entry into computerized systems. The ability to reliably scan this media is a vital issue.

Nonetheless, many installations witness the creation of labels, and the placement of those labels on objects that are then transported to a destination commonly known as a scanning station. Voila! The scanner doesn't scan or the scanner scans bad data or bad data results from scanning. Why?

Unfortunately, printed media is rarely checked before entering the system flow. The quality of both code and data has the potential of being part of the problem as opposed to being part of the solution. Let's go back to the definition. Verification means many things to many people. Will the media scan? Is the code printed to specification? Does the human readable data agree with the encoded data and is the data correct? Obviously there are multiple levels of verification.

If labels are being generated for internal use, the data must be correct and the bar code quality need only be sufficient to ensure the successful use of in-house scanners. As labels are being printed, someone should periodically scan them using the same scanners that are in actual operation. This should be done on a random basis with the frequency based on volume and common sense. With this process in place, problems are identified prior to bad labels reaching the point-of-scanning when it is too late.

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However, if labels are being placed on cartons or products bound for an outside organization, the complexity intensifies. QUALITY COMPLIANCE (QC) remains an ever present challenge. The real issue in this scenario is the type of scanners that are going to be used. In most cases, this information is not known. For the many companies supplying organizations like the Department of Defense (DoD), automotive (AIAG) or health (HIBCC) industries, media must be created that meets applicable standards and specifications. Compliance can be achieved with the use of readily available verification or analyzer hardware. Again, this function should be performed on a random basis or, if important enough, on every label.

These devices can provide information as to whether or not a specific symbol satisfies a given standard or specification. Another alternative is for verifier equipment to issue a quality grade (A, B, C, D or F) based on the *ANSI GUIDELINE FOR BAR CODE PRINT QUALITY*.

KEY POINT: *A significant majority of bar code implementation problems can be traced back to the lack of a verification process. Whether generating media for internal or external purposes, QUALITY COMPLIANCE (QC) will be achieved by making verification a part of the process. Do it manually on a random basis or, do it with sophisticated equipment. Regardless of the chosen method, DO IT!*

6th COMMANDMENT: Scanner Resolution and Media Density

The second largest problem observed at user locations is the failure to match the resolution of the scanner to the density (CPI) of the media. Stated another way, the size of the spot of light coming out of a scanning device should be slightly less than the narrowest element ("X" dimension). Refer to Figure 5.

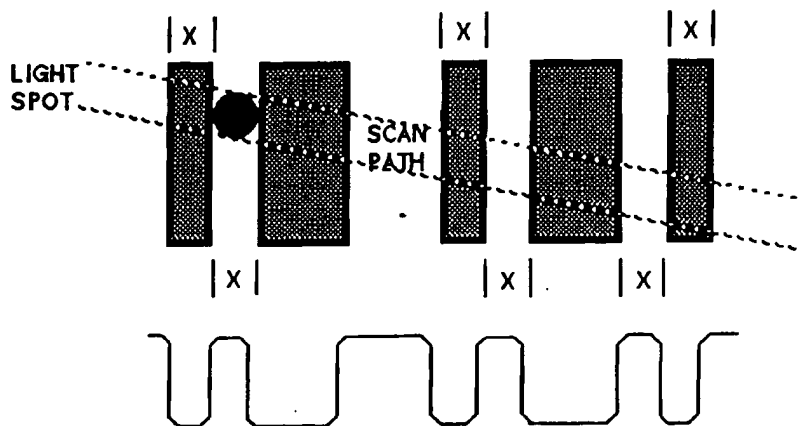


Figure 5

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This compatibility provides a basis for accurate and efficient scanning.

If the scanner resolution or spot of light is significantly larger than the narrowest element, as shown in Figure 6, a major distraction occurs when scanning is attempted. Therefore, scanning becomes more difficult.

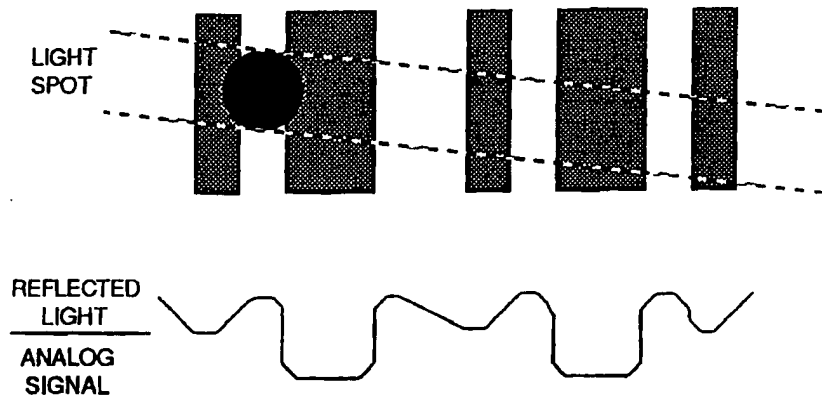


Figure 6

If the scanner resolution or spot of light is significantly smaller than the narrowest element, as shown in Figure 7, scanning is not only difficult but errors can readily occur. In this instance a speck of ink or dirt in a space area results in the interpretation of a bar. A void in a printed bar results in the interpretation of a space. The right combination of wrong bars and spaces could result in the acceptance of bad data into the system.

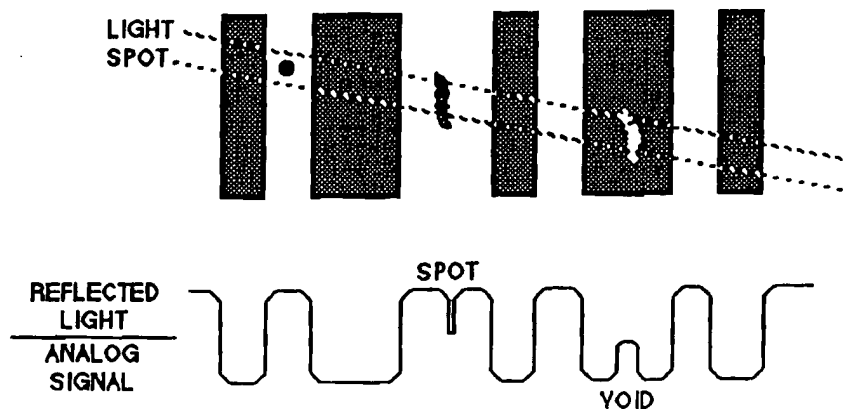


Figure 7

When using contact scanners (wands), the resolution of these devices should approximate 80% of the narrowest element ("X" factor) on the media being scanned. For example, if a symbol contained a 10 mil narrow bar and space, the wand

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resolution (spot size) should be 8 mils.

For most applications and as a general rule, when using wands, three different resolutions are suggested as illustrated in Figure 8.

WAND RESOLUTION	"X" FACTOR RANGE (Mils)
Low	7.5 to 10
Medium	10 to 14
High	14 to 20

Figure 8

Moving-beam laser scanners are much more forgiving and, as such, one model will suffice for all of the combinations shown in Figure 8. This occurs because the noncontact device can be manually moved closer to or further from the target thus changing the focal point or resolution. This is one of the primary advantages of laser technology.

It should be noted that some applications will utilize media with "X" factors less than 7.5 mils or greater than 20 mils. In these cases, it is very probable that special models of contact or non-contact scanners will be required.

KEY POINT: *For the most effective and reliable scanning, be certain that the resolution of either contact or non-contact devices be matched properly to the narrowest element of any one symbol. If there are applications that demand the scanning of a wide variety of narrow elements, non-contact scanners may be required.*

7th COMMANDMENT: Code Height and Quiet Zones

The height of the bar code pattern is a factor that must be considered when using any type of scanning device including moving-beam lasers. However, the height factor is most important when hand-held wands or fixed-beam laser scanners are used, and can often be the difference between easy and difficult scanning. Humans do not naturally draw straight lines. They also do not scan in straight lines. Typically, arching motions are used as shown in Figure 9. Notice how the significance of the bar code height will increase as the encoded field grows in length.

RELATED PROCEEDINGS APPENDIX

None.

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